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SEPTEMBER 1992
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Key Black

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C M Y K

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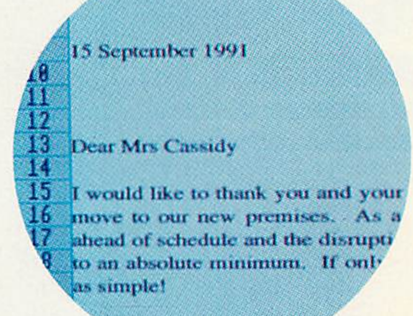
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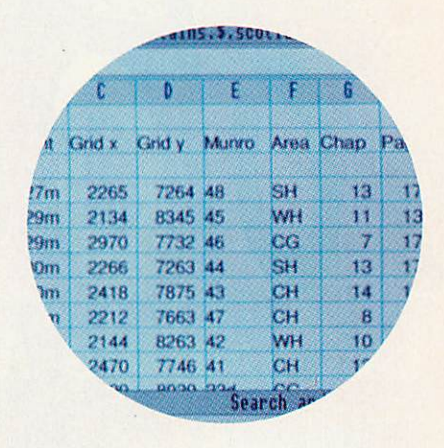
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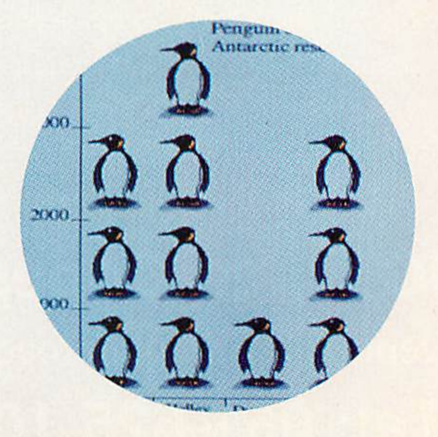
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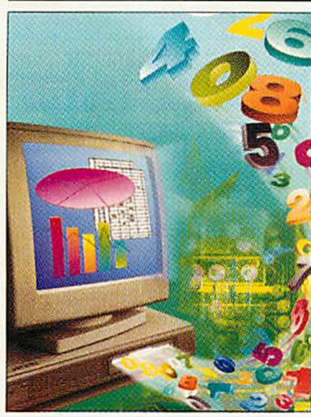
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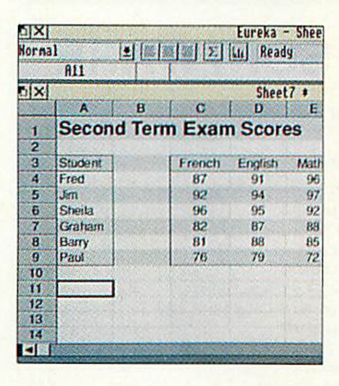
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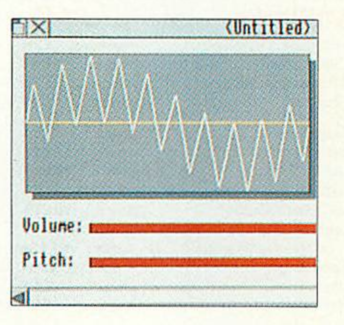
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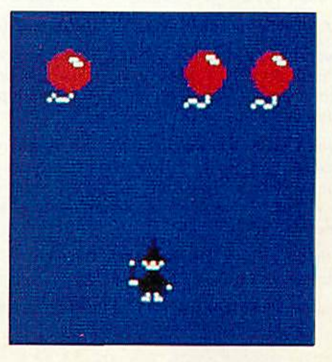
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TechWriter	Icon	£245
Thesaurus	CC	£38
Thinklink	Xavier	£29
Thundermonk	Minerva	£8
Timetabler	Minerva	£549
TimeWatch	Mitre	£24
Tiny Logo + Tiny Draw	Topologika	£27
Titler	Clares	£120
Toolkit Plus	Clares	£35
Tools Graphics, drawfiles	Micro Studio	£23
Top Banana	Hex	£19
Touch Type	Iota	£39
Tower of Babel	Cygnus	£17
Trace	David Pilling	£5
Tracer	Midnight	£46
Tracker	Leading Edge	£37
Transport, drawfiles	Micro Studio	£25
Trivial Pursuit	Domark	£22
Turbo Type	CIS	£20
Tween	Ace	£26
Twin	Acorn	£24
Twin World	UBI Soft	£14
TWO (Task and Window Organiser)	ICS	£15
– site licence		£60
TypeStudio	RISC	£43
Utility Disc 1	Data Store	£8
Utility Disc 2	Data Store	£13
Utility Disc 3	Data Store	£7
Utility Collection	Data Store	£21
Vector	4mation	**£75•**
View»Mac 3	Human	£65
– Arc/Mac Cable	Human	£24
Vox Box	Clares	£47
Waterloo	Turcan	£23
Wimp Game	Fourth Dim	£16
Wonderland	Virgin	£24
Words and Pictures	Chalksoft	£17
World Championship Boxing Manager	Krisalis	£20
World Geography Maps, draw	Micro Studio	£23
World Map Study, age 7-16	ESM	£42
Worldscape	Leading Edge	£16•
World Wildlife, sprites	Micro Studio	£16
Worra Battle	Oak	£14
WorraCAD	Oak	£83
X-Fire	Fourth Dim	£21
Z88: A Dabhand Guide	Dabs	vo £15
Z88 PipeDream Guide	Dabs	vo £15
Zarch	Superior	£14
Zelanites (not OS 3)	Micro Power	£18

HARDWARE

A4 COMPUTERS

Mark your order 'A4 PRIORITY LIST'
Education discounts available

Item	Supplier	Price
2 Mb	Acorn	£1399
4/60 Mb (60 Mb Hard Disc) with free PC Emulator 1.8	Acorn	£1699
4/80 Mb (80 Mb Hard Disc)	Acorn	£POA
A4 Extra Battery Pack	Acorn	£50
A4 Shoulder Bag	Acorn	£35

A5000 COMPUTERS

Item	Supplier	Price
2Mb Hard Disc Colour System	Acorn	£1499
– as above + Learning Curve		£1530

(Finance & special schemes available)

MEMORY

Fitting extra unless otherwise stated
† Fitting easy ‡ Fitting needs expertise

Item	Supplier	Price
A3000 2 Mb Non-upgradable †	IFEL	£55
A3000 2 Mb Upgradable †	IFEL	£63
A3000 4 Mb †	Atomwide/IFEL	£140
A310 2 Mb Upgradable soldered ‡	IFEL	£99
– as above + MEMC1a		£149
– as above + MEMC1a + fitting		£200
A310 4 Mb soldered + MEMC1a ‡	IFEL	£225
– as above + fitting		£277
– as above + fitting + OS3 carriers		£298
A5000 2-4 Mb Non-upgradable †	Atomwide	**£85**
A5000 2-4 Mb Upgradable †	Atomwide	£109
A5000 2-8 Mb including fitting	Atomwide	£500
A5000 4-8 Mb including fitting	Atomwide	£391
A540 4 Mb †	Atomwide	£238•

ideA'92 *The next generation*
Please see separate price list

MISCELLANEOUS

Item	Supplier	Price
386C PC Expansion Card	Aleph One	
– 1 Mb		£463
– 4 Mb		£579
4-slot 4-layer Backplane	IFEL	£59
9060S Monitor	Eizo	£450
A300/400 Fan kit	ICS	£15
A310 RISC OS Carrier Board ‡	IFEL	£25
A5000 Fitting Kit for second hard disc	ICS	£15
Arckey Function KeyStrip Holder	ICS	vo £3
– pack of 4		vo £10
ARM3 ‡	Aleph One	£189•
Clares Micro Mouse	Clares	£26
Dongle Dangle with screw fittings	ICS	£6
Fan filters (pack of 10) (not A5000)	ICS	£6
FaxPack	CC	£289
Floppy Discs, 10 × 3½" High Density		£10•
Monitor Stand for A3000	ICS	£21
Podule Case for A3000		£16
Seal 'n Type spill-proof Keyboard Covers		
– Archimedes / A5000	Kador	£14
– A3000	Kador	£14
TouchWindow	Lindis	£234
Whisper Fan Quietener (for A300/A400 series only)	ICS	£15

PRINTERS

Item	Supplier	Price
ArcLaser 300-6	Calligraph	£895
ArcServer 300-8	Calligraph	£985
Bubble Jet BJ-10ex	Canon	£205
Bubble Jet BJ10ex + TurboDriver	Canon/CC	£234•
Bubble Jet BJ-300	Canon	£360
Bubble Jet BJ-330	Canon	£405
Bubble Jet BJC-800 + TurboDriver	Canon/CC	**£1499**
Laser Direct HiRes4 with 50-sheet tray	CC	£849
– 250-sheet Paper Cassette		£99
Laser Direct HiRes8	CC	£1280
Laser Direct LBP-4 Card	CC	£325
LBP-4	Canon	£659
Refill toner cartridge for Canon EPS		£50
New toner cartridge for Canon LBP-4		£59

SCANNERS, DIGITISERS

Item	Supplier	Price
ArcScanner including Epson GT-4000	Clares	£1660
FaxScan	Spacetech	£94
Hawk V9	Wild Vision	£199
– A3000 version	Wild Vision	£278
iMage (Sharp JX-100)	Irlam	
– for A5000		£490
– for other computers		£589
Image Scanner	Iota	£383
– Colour upgrade	Iota	£148
– Fast parallel card	Iota	£98
– Lighting unit	Iota	£91
i-Scan 200	Irlam	£539
i-Scan 400	Irlam	£589
Pineapple Colour Video Digitiser	Pineapple	£195
– A3000 boxed	Pineapple	£230
ProImage (Epson GT6000)	Irlam	
– for A5000		£989
– for other computers		£1089
Scan-Light A4	CC	£277
– with Sheet Feeder	CC	£360
Scan-Light Junior 256	CC	£190
– A3000 internal	CC	£190
Scan-Light Professional	CC	£565•
– as above + SCSI interface	CC	£699•
SnapShot Colour Video Digitiser	Lingenuity	£195
– A3000 version	Lingenuity	£275
Spectra	RISC	£545
– A3000 Internal	RISC	£545
– A3000 External	RISC	£565
Vision Digitiser	HCCS	£49
– A3000 Internal	HCCS	£49
– A3000 External	HCCS	£62

I²C PRODUCTS

Item	Supplier	Price
AnDi Oddule	Baildon	**£30**
I²C Adaptor (needed unless you already have an I²C socket)	Baildon	£10
I²C SWI (enhanced IIC_Control)	Baildon	£15
– bought with Oddule		£5

AUTHORISED ACORN DEALER

ICS (Ian Copestake Software)

Dept B34, 1 Kington road, West Kirby, WIRRAL, Merseyside, L48 5ET

Tel: 051-625 1006 Fax: 051-625 1007

E&OE D61 92JL21

LICENSED CREDIT BROKER



ideA'92

built for speed. The new generation of IDE interface cards from ICS leaves the competition standing.

With **background mode** operation, our new 8-bit internal interface for the A3000 is already producing speeds in excess of 800 kb/sec with certain hard discs. 1.6 Mb/sec is possible with our 16-bit interfaces. And we haven't finished tweaking yet!

Not one, not two, but three levels of **password protection** provide the security your data really deserve.

Hard discs can have **partitions** so they appear as separate drives, with different protection levels if required.

Almost **limitless expansion** is possible via the I^2C port which our cards have always included as standard.

A3000 Internal 2½" ***ideA'92*** or A300/400/500 2½" 'Hard Card'	20 Mb	£212
	60 Mb	£349
	80 Mb	£449
A300/400/500 3½" Internal	40 Mb	£210
	80 Mb	£275
	100 Mb	£305
	200 Mb	£499
	340 Mb	£775

It took us some time to understand IDE, but then we started two years ago. If you've had problems with products from less experienced suppliers we'll do our best to help you pick up the pieces. We don't advertise what we can't supply. All the above are available as this goes to press.

Prices are for complete upgrade kits and exclude VAT. Carriage is free on UK prepaid orders. External options are also available. Not all interfaces yet include all of the *ideA'92* features – please check.

ICS (Ian Copestake Software)

Dept B34, 1 Kington road, West Kirby, WIRRAL, Merseyside, L48 5ET

Tel: 051-625 1006 Fax: 051-625 1007





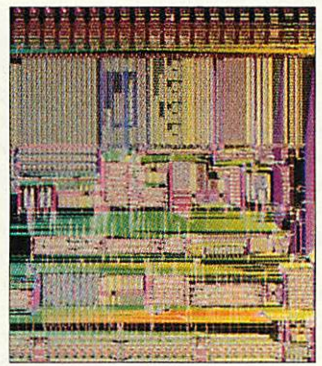
ACORN LEADS EUROPEAN PROJECT

ACORN IS to be the leading member of an EC-funded project to develop an advanced portable computer for the European education market. It will be Arm processor-based and offer high-tech features like speech recognition and versatile comms links at an affordable price.

The Power (Portable Workstation for Education in Europe) Project, as it is modestly called, includes Acorn and Arm Ltd from the UK. Opsis and Idate, both of whom have expertise in microelectronics display and wireless communications technology, join the project from France. Portugal's contribution comes from Pluricom, a telecomms and IT consultancy.

Other contributing companies include Italian software developer Etnoteam, Lernout & Hauspie Speech Products from Belgium and the Portuguese University of Aveiro.

Funding comes from Esprit (European Strategic Programme for Research into IT). The project is set to last for 36 months. Firstly, research will be carried out to identify market trends and requirements, then actual products will be developed. Although education is the priority market, the project members expect there will be an overlap with other areas. Looking even further forward, the project aims to produce computers based on next-generation Arm chips, with another Esprit project in mind, the Open Microprocessor systems Initiative (OMI).



Arm chips get into Europe

Acorn's technical director, Malcolm Bird commented: 'Many elements of the enabling technology for this project already exist in Europe and in many cases Power will concentrate on developing and integrating this technology into the production of a portable product.'

He added: 'We are currently witnessing a rapid growth in the installed base of portable computers. Education has always sought the freedom that portability offers and in the schools of tomorrow all children are likely to have their own personal computers.'

On the face of it the Power Project looks great for Acorn. As project leader it should have the greatest influence and its Arm-chip experience will be invaluable. However, it remains to be seen if Risc OS will form part of the project.

This isn't the first Euro-project Acorn has been involved in, but this is the first time that Acorn will actually lead. Acorn could be on the verge of gaining a big slice of the European education market, which is many times the size of its market here in the UK.

CUMANA'S CD-ROM PORTFOLIO

THE LATEST CD-Rom Portfolio for Education has been published by CD-Rom specialist Cumana. The publication is a no-nonsense concise guide to educational CD-Rom publications and their hardware requirements, including the growing range of discs now being developed for the Risc OS desktop. The portfolio contains over 40 titles, mostly developed in the UK, costing between £20 and £495 suitable for pupils between the ages of nine to 18.

Cumana's managing director John Simnett commented: 'By building the range on two themes, titles that have educational merit and titles published in the UK, Cumana hopes to encourage the growth of home produced educational software relevant to the National Curriculum.'



CD-Roms galore from Cumana

- SCSI users might like to note that Cumana has produced a user-friendly management program, SCSI Management, which lets the user partition SCSI hard discs and password protect sections containing confidential data. Read or write-only privileges can also be assigned to the same sections. The program was developed specifically with IT advisors in mind.

The program can also be used in conjunction with Cumana's *EasyShare* networking firmware to section shared SCSI peripherals on the network. Contact Cumana on (0483) 503121.

JOINING THE CLUB

SONAMARA means 'sound of the sea' in Gaelic and it's the name of a new company formed by ex-Acorn area sales manager, Peter Turnbull, which aims to unite Archimedes-using individuals and channel their collective influence to extract the best from the Acorn market.

Turnbull has been developing his idea for several years and, last Christmas, he finally started to make that dream real. The object is to register, free of charge and with no obligation, potential Acorn product customers in what Turnbull describes as a club. Unlike existing Acorn user groups which tend to cater for the technically oriented, Sonamara is aimed at users who aren't necessarily boffins.

Sonamara will differ from traditional marketing clubs of the book and record variety by offering a much more personal relationship with members. One of Sonamara's key aims is to persuade third-party developers to tailor or develop new products according to specifications drawn up by the club members. Turnbull has already been in contact with a number of well-known industry names which he will be revealing later in the year.

For further details, write to Sonamara, PO Box 151, Dunnington, York, Y01 5YT.

MORE MIDI MUSIC

AN ESTABLISHED player in RM Nimbus music education, Impac Resources Ltd, has turned its attention to the Arc and converted three of its popular Midi packages, *Tunemaker*, *Rhythm Kit* and *Melody Train*. All cover aspects of the music curriculum from Key Stage 1 to Key Stage 4 and offer the choice of Midi output or Arc-generated sound. Impac Resources Ltd is on (0751) 77456.

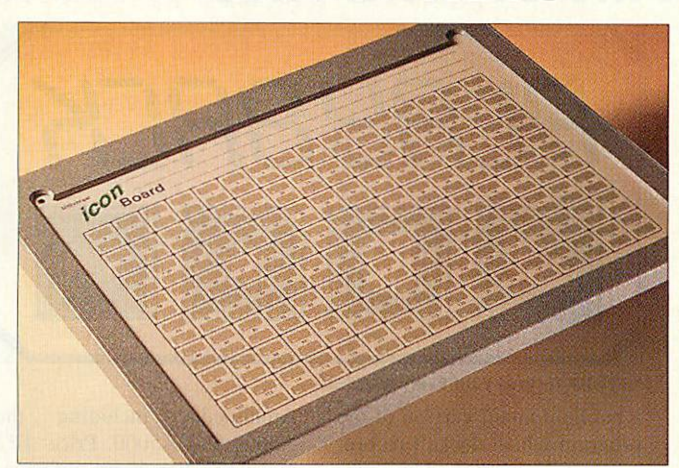
NEW VERSATILE OVERLAY KEYS

MIKRODAISY International claims its new Universal Icon Board is the most versatile overlay keyboard on the market. The new A3-sized pressure-sensitive device has an angled working surface and has either 128 or 256 keys. Overlay sheets are located firmly by a a retaining slot.

The board can be connected to an Archimedes, or even a PC or Apple Macintosh, simply by changing a connector. Either the User Port or serial interface can be used and no external power supply is required.

Mikrodaisy says the new board is compatible with most existing software, and soon Mikrodaisy's Intercept Family standard will offer a simplified software platform for users wishing to develop their own new applications.

A Universal Icon Board for the Archimedes is priced at £159, the Intercept software costs £39 and the two together are discounted to £177. Mikrodaisy can be contacted on: (0703) 455004.



Universal icons from Mikrodaisy

CD-ROM MANUALS

CAMBRIDGE-BASED Emerald Publishing is to publish a set of Acorn technical documentation on CD-Rom. The disc is aimed at Risc OS developers and will contain programmers reference manuals (PRMs), DDE/C/Assembler manuals plus guides to BBC Basic, Risc OS 2 and 3 User and Applications and more.

The advantage of CD-Rom presentation is in powerful searching, a note-taking facility, user-definable book-marks and the facility to view more than one page from different sections at the same time. Emerald expects to have the CD-Rom available in time for October's *BAU* show.

● Also from Emerald Publishing is *DrawBook*, described as a cheap alternative to Archimedes DTP software. It arranges *Draw* images into sequences of pages with user-edited headers, footers and page numbers. The whole sequence can be printed as a single multi-page document with a single command. *DrawBook* costs £17.62, including VAT, and there is a free site licence for schools.

Emerald Publishing can be contacted on (0223) 840138.

PORTABLE ETHERNET

ATOMWIDE has produced the Acorn A4's first dedicated hardware peripheral, an Ethernet adapter. It is a pocket-sized device which gets around the A4's lack of a podule expansion bus by connecting to its parallel printer port. Connection to the network is over thin Ethernet cabling (10Base-2). TCP/IP protocol software is included and the interface will be compatible with Acorn's AUN (Acorn Universal Network) system which will be officially unveiled later this year.

'Ethernet and AUN are the way forward for networking with Acorn computers. By supporting Acorn's own software and industry standards we can guarantee our customers complete compatibility with Acorn's networking strategy, which we fully support,' said Atomwide's managing director, Martin Coulson.

Atomwide intends to release the A4 Ethernet adapter in October, priced at £234 inc VAT. Education discounts will be offered. Atomwide is available on (0689) 838852



Network connection for the Acorn A4

NEWS IN BRIEF

● IN A DEAL worth £250,000, Greyhound marketing is to market Arc products produced by The Vertical Twist (TVT), the company which was formed by Andrew Foyle after he and The Serial Port's Hugo Fiennes decided to go their separate ways last year.

TVT produces about 20 different Arc add-ons and software packages from joystick interfaces and Midi samplers to programs like *Worldscape*, *Tracker* and *Investigator*.

The deal means that TVT products will be marketed under the new brand name Leading Edge. TVT can be contacted on (0243) 531194. Greyhound is available on (0532) 621111.

● *RemoteFS*, a remote filing system for Archimedes, is the second new product from Atomwide this month. The package enables a user of one Archimedes to access directories and files on a remote Archimedes. A multitasking Risc OS desktop front end is provided and copies of *RemoteFS* must be resident in both computers.

The connection could be via the serial port, or even the parallel port, if you have an A5000 or A4 computer with a bidirectional parallel port. Ethernet and modem to modem support will be added later. File transfers are error corrected but actual transfer speeds are dependent on the type of physical connection used, parallel or Ethernet being faster than serial. *RemoteFS* will cost approximately £60 inc VAT, and should be available from the BAU show in October.

For further information, contact Alex von Someren at Capricorn Consulting on 0223 300 781.

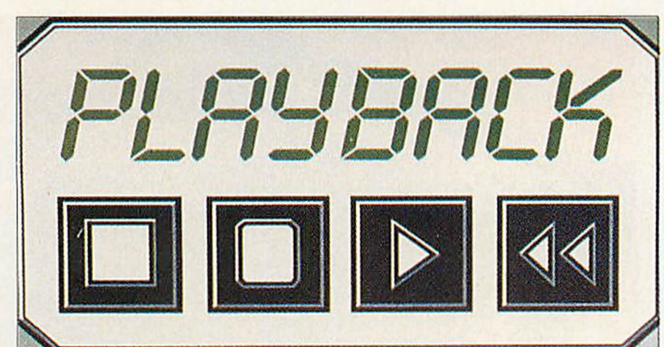
● ONE of the cheapest-yet CD-Roms for the Arc which uses the Risc OS user interface could be *The Really Useful CD-Rom Volume 1* from APA Multimedia. The disc contains several megabytes of sprite and *Draw* format clip art as well as a selection of sound samples.

Also provided are some digitised images to be featured on the company's forthcoming *Wildlife on CD-Rom* series, which is to be released at the BETT show next January. If you want more information, APA Multimedia can be contacted on (0634) 295 222.

PLAY IT AGAIN ON THE ARC

PLAYBACK, a program that records mouse movements and key-presses and lets them be replayed automatically has been produced by Risc Developments. When a session is replayed the computer will behave as if somebody is physically using it.

Possible uses include the creation of automatic displays and presentations as well as tutorials. Synchronised text commentary can also be added recordings, which can also be exported as Ascii text files for editing and fine tuning.



PlayBack records your every keypress

PlayBack recordings can be up to an hour long and there is a public domain version of the program which doesn't record, but lets anyone view pre-recorded *PlayBack* files in action. *PlayBack* runs on all Archimedes including the A3000 and A5000. Price: £22 inc VAT. For more information, contact Risc Developments on (0727) 40303.

ACORN DISTRIBUTION GOES DIRECT

TWO of Acorn's three official distributors, AB Eltec and Bonsai, have ceased to supply Acorn dealers. This leaves the road clear for Acorn to increase its direct distribution.

Hugh Symons Distribution Group remains as the sole independent distributor of computers to Acorn's 300 or so official dealers. AB will instead concentrate on the educational market as a value added-reseller while Bonsai looks set to leave the Acorn market altogether.

Acorn's marketing director, Mike O'Riordan, stressed that all dealers who formerly obtained supplies through AB and Bonsai would now be accommodated by either Hugh Symons or directly by Acorn. 'It makes a lot of sense for Acorn to get closer to its education dealers and its large consumer dealers and thereby aim for a higher market penetration and improve customer satisfaction,' said O'Riordan.

Acorn will step up its direct distribution to large education customers, high street multiples, superstores and value-added resellers. This ties in with recent enthusiasm for Acorn's future prospects expressed by Dixons' Alan Dickinson and the managing director of the PC World Super Store, Jan Murray.

With direct marketing computer manufacturers like Dell and Elonex going great guns in the PC world, despite the recession, it's only logical that Acorn should seek to emulate that success by reducing the middle-man factor on its distribution costs. The increased margins that should result could be converted to increased sales through reduced pricing or increased presence in important high street outlets like Dixons.

However, the passing of Bonsai and AB is lamented by some. One Acorn dealer we spoke to had worked hard over recent months to build up a good relationship with AB after switching from Bonsai and was very disappointed with the news.

Meanwhile, Bonsai supported the distribution of third-party products, which meant convenient one-stop ordering of a complete range of Acorn-related goods for smaller dealers. It's unlikely that Hugh Symons will carry such a comprehensive catalogue.

Acorn's press-release contained friendly quotes from both AB and Bonsai, but feedback from the grapevine indicates that there has been some anxiety among AB and Bonsai sales staff for several months with regard to their future dealings with Acorn customers.

In recent years Acorn has failed to gain a firm foothold in the high-street, concentrating on their official dealers. These latest changes could spearhead Acorn's most forceful attempt yet to establish a high street foothold once and for all.



Acorn could gain a greater high street presence in stores such as Dixons

NEWS IN BRIEF

● Mijas Software's new simulator package, *ArcSimp*, targets Archimedes users who need to produce models of anything from everyday systems like the internal combustion engine to the laws of thermodynamics. *ArcSimp* uses graphical building blocks to construct functioning simulations which obey basic mathematical and geometric rules. Mijas says *ArcSimp* could be used to illustrate the laws of dynamics, thermodynamics, control systems or robotics. Resulting models could then be studied, modified and tested by students on the desktop rather than on a physical model.

New *ArcSimp* building blocks can be created and added by users who have access to the Acorn C language development system and *FormEd*. Mijas has produced an *ArcSimp* demonstration disc, which is available for £5, – the first 20 applicants get one free. A demo disc can be exchanged for a fiver off the full package, which costs £59 inc VAT. Contact Mijas Software on (0962) 89352.

● Several volumes of classic award-winning clip-art have been ported from the Apple Mac and IBM PC to the Archimedes. The art work comes from the Canadian firm Image Club Graphics Inc and will be distributed for Arc users by Peterborough-based firm Matt Black. A welcome bonus is that Arc users will only have to pay about £30 per volume compared with the £79.95 Mac and PC users have to fork out. Images are supplied on Arc discs in *Draw* file format. The collection comprises 23 volumes ranging from general business graphics to specialist areas like agriculture and map making.

An Image Club catalogue is available from Matt Black, costing £7.95, with a fiver refunded on your first order. Matt Black is on (0733) 315439.

● Broad Oak Computers has cut the fees for its Archimedes software training courses to £59 inc VAT per day. The courses cover a wide range of packages including *Impression, Squirrel, Schema, Prophet, First Word Plus, Artisan, Pendown* and the PC Emulator. Soon to be introduced are courses on BBC Basic V, C and Risc OS programming. Broad Oak is on (0279) 718767.



MAGPIE

SPREADS ITS WINGS

If a picture is worth a thousand words, how many more words is a movie with sound worth?

***Magpie* is an easy-to-use 'Multimedia' program for Acorn Archimedes. *Magpie* lets you put words, pictures and sounds together on the same page. The pictures can be drawings, photographs, and now moving video too.**

Use *Magpie* for:

- Simple page design and DTP
- Reports and projects
- Delivering graphics resources to users
- Branching stories
- Presentations and rolling demonstrations
- Complex information systems
- CD ROM publishing.



CD Audio

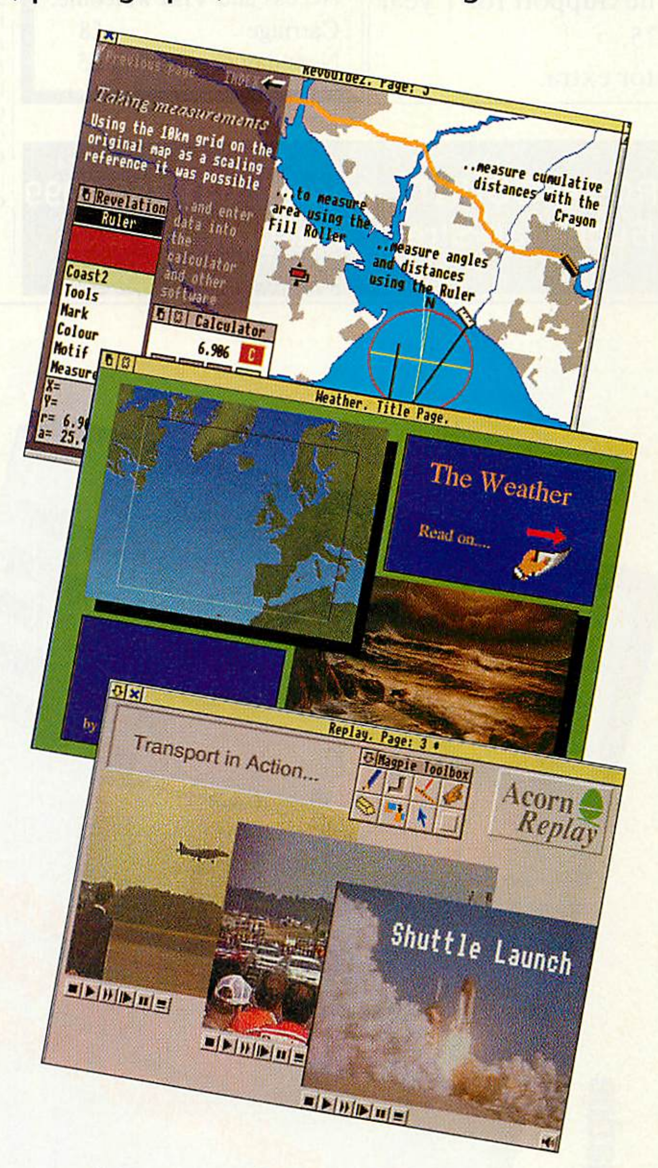
But that's not all! *Magpie* supports CD Audio too. Now you can play any section or track of an ordinary audio compact disc at the press of a button. Combined with the ability to automatically turn pages, you can bring sounds and images together in ever more imaginative ways.



Acorn Replay

Acorn Replay is a brand new facility which allows moving video (most commonly from a CD ROM) to be played through an Archimedes computer.

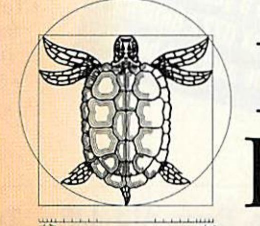
You can now place a Replay movie on a *Magpie* page. Children will find the simple 'cassette recorder' type control icons easy to use. Imagine a project about space. Now you can make *Magpie* pages with text, drawings, scanned images, sound effects — *and* a colour film of the space shuttle taking off, complete with sound!



MAGPIE — Information By Design

Single user £59
Primary Site Licence £190
Secondary Site Licence £330

Magpie's new features are available free of charge to registered users upon request.



LONGMAN LOGOTRON

124 Science Park
Milton Road
Cambridge CB4 4ZS
Tel (0223) 425558
Fax (0223) 425349

UPDATE TO EASIWORD PACKAGE

MINERVA Software has now released its completely revised *Easiword* entry-level word processor. *Easiword* is a Wysiwyg word processor which is now Risc OS compliant and uses Risc OS printer drivers. A 50,000 word integral spelling checker is standard. At £70 inc VAT, *Easiword* challenges *First Word Plus*.

The other way to obtain *Easiword* will be as part of Minerva's revamped integrated office package, *Desktop Office 2* at £116 inc VAT. In fact customers will get both versions of *Easiword* supplied with *Desktop Office 2*. Contact Minerva on (0392) 421762.

$.DemoData

TABLE TO SHOW STAFF
CHANGES AFTER IMPLEMENTING
OUR NEW SYSTEM

DEPARTMENT	BEFORE	AFTER	REDUCTION
SALES	25	25	0
OFFICE	62	53	9
WORKSHOPS	118	97	21
WAREHOUSE	12	10	2
TRANSPORT	17	15	2

1 New Equipment
The future installation of our new machinery in the workshops and computers in the offices ... a smaller work force will be capable ... than ever before. Some redundancies may ... proposing to move some useful people to ... and that "natur... gradually without ...

EasiWord: File, Select, Effect, Layout, Utilities
File: Info F1, Save F3, Print
Print Document: HP LaserJet, Copies: 1, Print

Now Easiword could be easier than ever

POLISHED PUBLISHING

THIS month we received a very smart newsletter produced by the Polish Association of Mathematics Teachers



– Czy masz dla mnie zadanie?

using an Acorn A540 DTP system and *Impression 2* software. Help from the EC Tempus programme enabled the association to be set up. The Electronic Font Foundry (EFF) supplied 200 Polish character fonts for the project and the EFF itself has so far supplied half a dozen other Acorn DTP systems to Poland.

If any Polish readers can translate the caption in the newsletter's cartoon we would all be very interested.

NEW ARC ENTERPRISES

FORMER *Risc User* technical editor Alan Wrigley has resurfaced to set up a new software house, Rheingold Enterprises. Several software releases are promised over the next few months, the first of which, *TextAid*, should be available now. This program lets the user set up versatile text macros which can be inserted into documents at the click of a mouse. *TextAid* can also grab text from text icons and window title bars plus convert between CSV and TSV file formats. *TextAid* costs £9.95.

Next on the schedule is *TimeLord*, a time management package, and then *Archetype*, which is an enhanced version of *LabelMaster Plus*, originally published under the Labelwise banner. Contact Rheingold on (0484) 846126.

● Desktop Computers Ltd is another new company offering Arc-based systems for specialist requirements. It was set up by the people behind Silicon Vision Ltd.

Although Silicon Vision is already an Acorn dealer, Desktop Computers will focus on hardware, selling ready-made hardware and software solutions for electronics design, desktop publishing, education, computer aided design (CAD) and programming. The systems will be based around Silicon Vision software such as *Risc Basic* and *SolidCAD*, as well as applications from other companies. Contact Desktop Computers on 081-861 2173.

ACORN THINKING

LAST month's launch of the Acorn A4 portable computer was regarded by some as long overdue. First knowledge of the portable Archimedes project was revealed by Acorn over 18 months ago and a prototype was shown in January at the BETT Show. However, if Acorn's recent investment in the services of two external consultancies is successful we could see future Acorn computers taking less time to go from conception to production.

The two Cambridge-based firms are Inwood Ryan Ltd and Management Dynamics. The former specialises in the integration of product development while Management Dynamics is described as a firm of organisational psychologists. Both have been taken on to establish a fresh approach within Acorn.

New practices Acorn will be experimenting with include concurrent engineering techniques and total quality management (TQM). Inwood Ryan and Management Dynamics were recently retained by Acorn for a 15-month period after a series of successful training courses.

We could be seeing some fruits of these efforts at the *BBC Acorn User* Show in October this year.

NEWS IN BRIEF

● Advanced Risc Machines Ltd (Arm Ltd) has gained EC funding for a project to investigate the use of the Arm Risc processor macrocell in deeply-embedded processor applications, where the Arm processor forms part of a much larger chip developed to do a specific task. Arm Ltd's partners in the project are GEC Plessey Semiconductors, the communications division of the Dutch electronic group Philips and IRIS, an Italian organisation which develops custom chips for music applications.

● Intel has invested US$50 million in VLSI Technology, the minority shareholder in Arm Ltd, and original manufacturer of Arm chips for Acorn. According to an Arm Ltd spokesman, Intel's move – which nets the leading supplier of PC microprocessors about 20 percent of VLSI – is unrelated to Arm Ltd activities. However, the word is that Intel is keen to develop a 386SL-based integrated chip for use in so-called palm-top devices like the Arm 610-driven Apple Newton.

● Fresh from confirmation of its position as Acorn's exclusive distributor (see other news this month) Hugh Symons Group PLC has announced it has purchased the Concept Keyboard Company. Hugh Symons says it intends to build on the Concept Keyboard's success in UK schools by developing overseas markets and industrial applications. The Concept Keyboard Company can be contacted on (0962) 843322.

● Oldham-based education specialists, Northwest SEMERC has produced *My Town/Village*, the latest Archimedes resource disc to go with the *My World Framework* package from Derbyshire Descit. The package is designed for 5-11 year olds (Key Stages 1 & 2) and works to stimulate language development, discussion and problem solving using examples from a local community like houses, bungalows, flats, churches, and so on.

These can be represented in two or three dimensions and used by both children and teachers for matching pictures and text and building sentences using a mouse or a tracker ball. *My Town/Village* costs £8.80 inc VAT. For more information contact Northwest Semerc on 061-627 4469.



REDIFFUSION TAKES FLIGHT

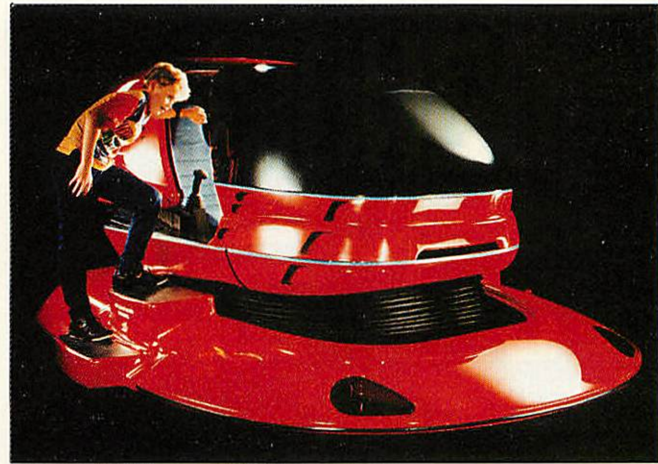
REDIFFUSION, one of the world leaders in flight simulator technology, has turned to the power of the Arm3 for its latest creation. The Commander is an advanced video arcade machine, capable of running games that require real-time sound and graphics.

The system will allow any vehicle, real or imaginary, to be simulated. The unit is designed to seat two people, both of whom have control of the craft using their joysticks.

A single 26in high-resolution colour screen is used to provide a forward view, while a smaller 12in monochrome screen simulates necessary read-outs such as altimeters. Graphics on each screen are controlled by a separate Arm3 processor.

Sound is in full stereo with 'CD' quality. Another Arm3 is used to send signals to a Midi port to generate all the required 'bangs and whistles'. Sound effects are relayed to the players through two speakers.

Using experience gleaned from developing simulators, Rediffusion has made the Commander as realistic as possible by using the Arm's speed to provide real-time monitoring for calculations. Every move of the joysticks is recorded and used to compute the position, location, and so on, of the simulated vehicle.



It's not a bird, it's not a UFO, it's Commander

Although Arm technology is used for the 'more complicated' areas, the program controlling the simulator (ie. the game itself) runs on a rather ordinary 286 PC. This unfortunately means that ports from the Commander to the Arc are extremely unlikely.

The machine is certainly a lot cheaper than the average commercial flight simulator; it's a snip, really, at £45,000, affordable for most arcades. So if you really want to drive the ultimate games machine, contact: Rediffusion Simulations Ltd, Bournemouth International Airport, Building 332, Christchurch, Dorset, BH23 6SE.

A SHARPER IMAGE FOR IRLAM

IRLAM instruments, well known for its scanner upgrades for the Archimedes, is working in conjunction with Acorn to develop a multimedia workstation, called Multiworks.

The machine will be built around the existing A5000 and will include a number of expansion cards that go to make up the system. Irlam Instruments' recently released Moving I-mage expansion card will form the basis of the multimedia 'engine'.

A lot of definitions have been put forward for 'multimedia'. It is, for those still unsure, the use of graphics (still and moving), text and sound together as a teaching or pesentation tool.

Imagine an encyclopaedia that you can not only read and look at, but watch and listen too as well. Such a product already exists and this is only the start of what promises to be an extremely exciting area of computing.

Compact discs are used to store the vast amount of data required for moving pictures and sound. Creating such CDs has in the past been expensive and time-consuming.

Pictures must be grabbed one at a time and then compressed to take up as little storage as possible. An adapted version of the Moving I-mage card will digitise a continuous stream of pictures at 25 frames per second, compress each one as it does so, and save the output to a hard disc. This is made possible by using hardware picture compression to convert images into JPEG files.

Sound as well as graphics is an important part of multimedia, and Irlam Instruments has also developed a 16-bit sound sampler to capture high-quality audio. The card uses an on-board microprocessor to control the digitiser which means that complex sound processing can be carried out in real-time.

Given the necessary software, the card could be used as a guitar effects 'box' or a sound 'shaping' unit similar to those produced by Yamaha. Like the graphics, sound can and should be compressed to save space, and Irlam instruments are also working on this.

The whole project is being aimed for a launch some time in the late summer and looks to be an important step forward.

Further information can be obtained from: Irlam Instruments Ltd, Brunel Institute for Bioengineering, Brunel University, Uxbridge, Middlesex, UB8 3PH. Tel. (0895) 811401.

NEWS IN BRIEF

● *Revelation 2*, widely regarded as the definitive Risc OS painting package, is to undergo another revision. Even after major improvements over the original program, *Revelation 2* is still lacking in a number of areas. A decent grid and the implementation of 'hot keys' are the first things that spring to mind.

Revelation 3 is still being developed and details are still being kept under wraps. A launch date close to the *BBC Acorn User* show is expected. Longman Logotron has promised to spill the beans soon, so watch this space.

● *Banner*, a new program from Kudlian Soft, allows you to say it with very large letters on your printer. Making full use of outline fonts and Risc OS printer drivers, *Banner* will produce 'banners' either sideways on fanfold paper or on single sheets (for example, on a laser printer) that can be joined together.

Many effects can be implemented including drop-shadowing and different colours and styles of borders. *Banner* is priced at £17.60 (inc. VAT) and is available from Kudlian Soft, 39 Dalehouse Lane, Kenilworth, Warwickshire, CV8 2HW. Tel: (0926) 55538.

● Atomwide has added a 14in flat-screen grey-scale multisync monitor to its range. It's capable of supporting horizontal scan frequencies of between 15Khz to 36KHz, which means it will support all Acorn monitor type 1 modes, without affecting software that runs in other modes (for example, games).

Used in combination with Atomwide's VIDC Enhancer software, the monitor will operate at a resolution of up to 1088××x448 pixels, making it ideal for DTP use. The monitor is excellent value at £175.00 (including VAT & delivery). Atomwide can be contacted at: 23 The Greenway, Orpington, Kent. BR5 2AY. Tel. (0689) 838852.

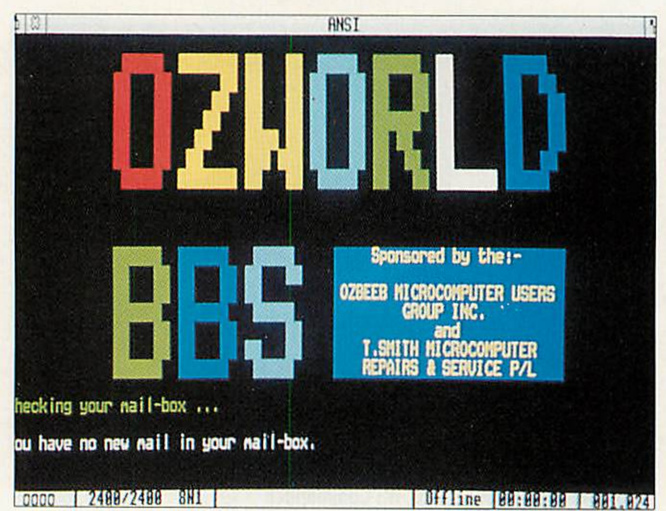
● Any news, comments, questions or moans would be greatly received on the graphics page. Please send your stuff to Rob Miller, The Graphics Page, BBC Acorn User, 101 Bayham Street, London. NW1 OAG.



GOING ONLINE DOWN UNDER

IF YOU fancy communicating with the antipodes, try Ozworld BBS in Australia. Run by an enthusiastic user group called Ozbeeb, it has been running since March 1990. Ozworld has many local message and file areas, as well as an Acorn Support area and, via FidoNet, it carries the specialist Acorn and Archimedes Echomail from the UK.

If you want to try it out, set your modem to 8-N-1, with as high a line speed as you can manage (up to 19,200) and dial 010 61 2 891 1886. Ozworld can also be contacted (much more cheaply) through the Arc Echo on UK bulletin boards.



Australians don't give a V24bis for anything else

IS 42 THE ANSWER?

BULLETIN board users spend much of their time on downloading files, and on-line time costs money. To download the most data in the least time you need file compression.

Most BBS operators store their files already compressed and allow message downloads to be pre-compressed. The question is – can you save even more time and money by using a modem compression standard as well?

The two common standards are MNP5 and V42bis. MNP5 uses a real-time adaptive algorithm that can give an increase of up to 50 percent in throughput on text data, but feeding it compressed files can cause it to waste time on trying more, pointless, compression.

V42bis gives about 35 percent better compression than MNP5 and only compresses data that needs it by analysing each block first.

To check which is better, I created two files containing the same data. One was a message scratchpad containing about 62k of Ascii text and the other a 16-bit compressed *Spark* archive of the same data, reducing it to 30K.

One point shows up immediately. Modem compression only works if the DTE speed (the data rate between the computer and modem) is higher than the line speed (the data rate between the two modems at each end of the line).

When using both DTE and a line speed of 2400 baud, no time is saved at all by either method. As soon as the DTE speed is increased to 9600 (at the Arcade end it rises to 38,400 if error-correcting modes are detected) immediate gains are achieved, and the V42bis standard easily comes out on top.

The 16-bit compressed file was received by V42bis in the fastest time, even with the overhead of time that was taken to compress it in the first place. A good second place is taken by the text file compressed on-the-fly by V42bis. So it seems that the answer to life, the universe and everything online is V42bis.

File Type	ASCII Text	16-bit Archive
Size (bytes)	63,922	30,751
Assembly time	12sec	12sec
Compress time	—	9sec

Throughput in cps excludes the above preparation times

	TEXT		ARCHIVE	
DTE/Line/Compr	Time	Cps	Time	Cps
2400/V22b/None	283	236	158	223
2400/V22b/MNP5	282	237	156	226
2400/V22b/V42b	282	237	159	223
9600/V22b/MNP5	185	369	153	232
9600/V22b/V42b	149	466	136	267

NODE JOB

ONCE a working bulletin board system has been established, and the hardware and software of the system have proved stable, the sysop can think about giving the BBS users the benefits of FidoNet membership.

The first step to becoming a FidoNet BBS is to find out the name of the host of a local FidoNet "Net" area. A FidoNet net Host is responsible for the correct running of all BBS nodes in that net and for checking that exisiting and prospective BBSs operate according to the rules of FidoNet.

The usual way to contact a Host is to log on to a BBS that is already on Fidonet and ask the sysop there for the name and number of the nearest Host system. The prospective sysop should then log on to that Host BBS and ask to be given a test node number. This temporary number is used to configure the BBS, and the sysop sends the Host a test Netmail message giving the telephone number of the BBS, which demonstrates the correct operation of the system. The Host will usually call the BBS back to confirm that everything is working properly, and then allocate a permanent node number, and send the sysop a copy of the FidoNet rules.

NEWS IN BIEF

● Miracom, the UK arm of US Robotics, is shortly to announce a 28.8kbps V.Fast modem. Although the V.Fast recommendation has yet to be ratified Miracom says that its new modem, a smaller unit than the Courier range, will feature a new HST2 standard that will be upgradable to V.Fast when it is agreed early in 1993. Unfortunately, existing V32bis UK-sourced Couriers and Courier Dual-Standards cannot be upgraded as the internal architecture cannot handle the higher speeds required.

● ISDN – The good news! BT has reduced connection fees for its ISDN service. The bad news? The reduction only applies to corporate users who install a minimum of 30 lines, which costs £3052. Competitor Mercury Communications offers companies a minimum of 15 lines, costing £1380, and claim that their service is 9 percent cheaper than that offered by BT.

● Campus 2000 subscribers now have local call access to the French Télétel system. In France, the service has many charge bands, but Campus Télétel has a single charge rate.

School subscriptions to Campus 2000 start at £134, and the additional subscription for Télétel is £15 per quarter and 12p per minute online connection (all prices are exclusive of VAT).

● Portable Port - Will the new Acorn A4 portable be the first Acorn computer product with a serial port that really works? Rumour has it the A4 has a new bug-free version of the serial chip that caused problems in the original A5000. Only time will tell.

● Lee Archer and Michael Davis are running a new RiscBBS system based in Yorkshire called Northern Arc BBS. The BBS runs on an A3000, and is online from 9pm until 8am. Call between those times +44 (0) 709 587341 at 8-N-1 v21/v22/v22bis – ANSI.

● YOU can contact me with any news or information you'd like to be included by writing to: David Dade, BBC Acorn User, 101 Bayham Street, Camden Town, London NW1 0AG, or by modem on Arcade BBS, User #2 081 654 2212 or 081 655 4412.

NEVRYON II











"Arcade Action for 1 or 2 Players"

Following the destruction of the alien menace, many years of peace reigned throughout the galaxy. However it was a fragile peace and the people of Nevryon knew that the day would come when they would be at war yet again.

In preparation for this Titanium was stored in reserve for military construction and new weapons and armaments were secretly developed. The fighter fleets were modernised and the ageing V5 fighter taken out of service. A new organisation, the Terran Defense Agency (T.D.A.) was created to monitor the ever present threat and make sure the planet was ready for siege once more.

The alien force meanwhile had a different strategy. The assault would not be directed at the mother planet, but to cause a blockade by invading the neighbouring planets and moons of the star Kirius which Nevryon orbited.

This move, not being anticipated by the T.D.A., was wholely successful and Nevryon was cut off from the universe at large with ever dwindling supplies. On the bright side though there were lots of nice big guns and quite stylish new space ships ready to go and cause some mindless destruction among the aliens out there. Nevryon might die but it was going to have a lot of fun first. Anyway, victory might be ours...

The Game

Nevryon 2 Technodream is the sequel to the much praised best-seller Nevryon. Combining all the best features of Nevryon with a vast array of new additions, Nevryon 2 keeps Acorn's 32-bit machines at the forefront of computer game design.

The main enhancement to the game is the two player mode. Two players on screen simultaneously to defeat the alien hoards. This adds a whole new dimension to the game taking it into the 90s! Of course there is also a one player option.

The playing area on screen is also much enlarged by allowing vertical scrolling in addition to horizontal scrolling. As you may expect the game is complemented by megabytes of arcade quality graphics, sound and music.

Specification

Two player simultaneous action. Vertical scrolling as well as horizontal.
Over 2 megs of arcade quality 256 colour graphics. Massive animated sprites.
Digitised stereo sound effects. Music by Peter Gillett.
25 frames/sec scrolling and animation. Parallax scrolling.
Control by keyboard or RTFM joystick.

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Including A3000, A5000 and all Archimedes

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Tel. (0742) 700661 or 769950



TECHNODREAM

PRODUCED by The Fourth Dimension .... THE 32-bit Acorn Games SPECIALISTS

The Fourth Dimension
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The following Fourth Dimension software is compatible with the Acorn A3000, A5000 and ALL Archimedes computers



Nevryon £19.95



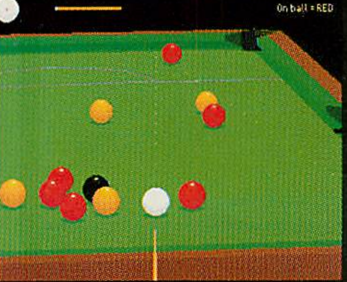
Chocks Away £25.95
Extra Missions £19.95 Compendium £39.95



Cataclysm £25.95
Can now be installed onto Hard Disc



Black Angel £34.95 (Hopefully July)
Can be installed onto Hard Disc



Break 147 & Superpool £34.95
Can now be installed onto Hard Disc

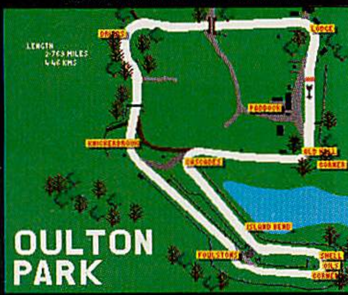


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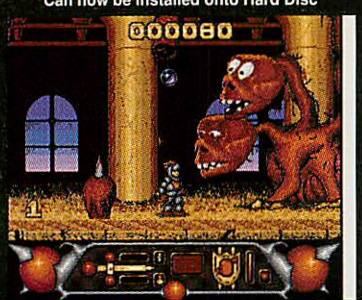
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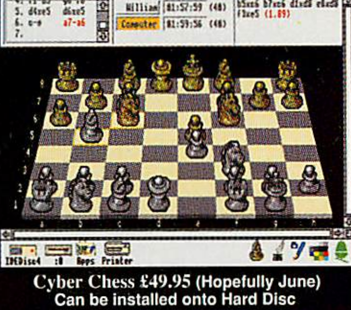


Saloon Cars Extra Courses £19.95 (Hopefully June) Compatible only with DELUXE version



Enter The Realm £25.95





Cyber Chess £49.95 (Hopefully June)
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Nevryon 2 - Technodream £25.95 (Hopefully June)
Can be installed onto Hard Disc



Chopper Force £29.95 (Hopefully June/July)
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Can be installed onto Hard Disc (Hopefully May)

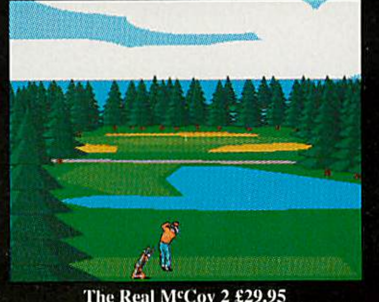
Grievous Bodily 'ARM £25.95
Can now be installed onto Hard Disc



Pandora's Box £25.95



ARCtist £25.95
Can be installed onto Hard Disc



The Real McCoy 2 £29.95
Apocalypse, Holed Out, The Olympics & Inertia



X-Fire £25.95

ENTER EUREKA

Longman Logotron's Eureka promises to take Arc spreadsheeting up to Mac or PC standards. Graham Bell previews it and looks forward to the real thing

One of the major software attractions at this year's Acorn User Show will be a spreadsheet: Longman Logotron's long-awaited *Excel* clone, *Eureka*.

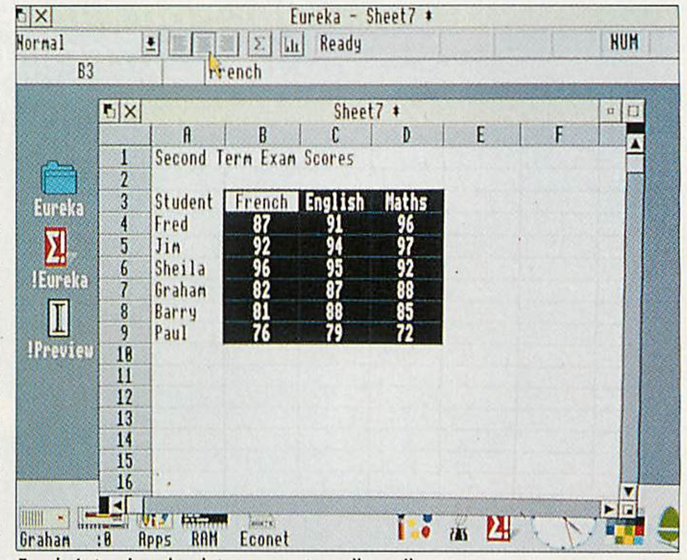
There's little doubt that Microsoft *Excel* is the spreadsheet of choice in both the Mac and *Windows* worlds. It is estimated to have captured nine-tenths of the Mac spreadsheet market, though Borland's *Quattro* and, of course, the non-*Windows* versions of *Lotus 1-2-3* provide strong competition on the PC. But the decision to base *Eureka* upon *Excel* seems sensible – anything else would be swimming uphill.

FILLING A GAP

Hitherto the Archimedes has lacked a real spreadsheet in this class. *Pipedream* from Colton Software remains a quirky integrated application, attracting a committed following but remaining an uneasy mix of spreadsheet, graphic application and wordprocessor, and is still at heart based on characters. Clares' *Schema* showed some early promise and gained some good reviews, but it remains unreliable, and Clares and CRM, the author, have failed to develop it as promised. Can *Eureka* make it third time lucky for the Archimedes?

Double-clicking on *Eureka* installs it on the icon bar and opens up a new blank worksheet ready for use. In fact, it opens two windows, one showing the sheet itself, conventional looking and divided into cells, the second a 'fomula window' for typing in and editing the contents of cells. One cell is 'active', marked by a black outline, and the mouse pointer shows as a plus sign. Anyone who is familiar with *Excel* will instantly feel at home.

Typing text into the formula window is straightforward – anything you type simply becomes text or, if it can be construed as a number, it becomes number data. This is a quite intelligent part of the program – it recognises dates and times as well as plain numbers.



Eureka's top icon bar lets you centre cells easily

If you want to type in a block of data, then you can select a block by dragging across it with the mouse, or using Select then Adjust in the usual Risc OS way.

But A4 portable users have also been catered for: the active cell can easily be moved with the cursor keys, and selections made and extended with the F8 function key. Once a block is selected, it's marked in black. Each time you add a number, pressing RETURN will now move the cursor on to the next cell, but keeping with the selected block.

One innovation is that the size of the spreadsheet isn't fixed. Although the scroll bars can only be dragged so far down the sheet (initially to row 55), extra rows can be created at will by using the scroll arrows. This saves having to create extra rows and columns explicitly.

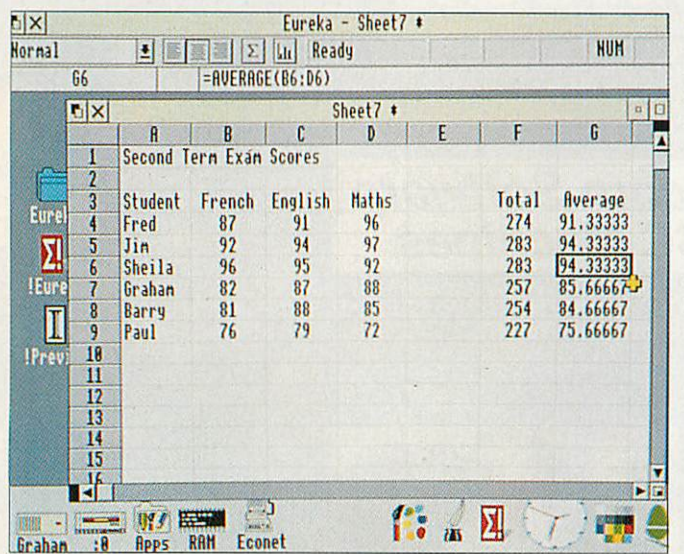
The toolbar at the top of the formula window can be used for a number of shortcuts: selecting a block and pressing the Centre button alters the alignment of the text and numbers in the selected cells. The other alignment buttons work similarly, and the Autosum button automatically adds up all the cells in a range – this is probably the most used spreadsheet function of all.

Another clever timesaver is the Autofill function, which will continue with the rest of the series if you type in the first term in a series like: Monday, January or even 1.

IT ALL ADDS UP

Formulae are prefixed with an equals sign – much easier than having separate text and formula modes, as with *Schema* and *Pipedream*, for example. *Eureka* supports well over 100 functions, including financial (present value, future value, depreciation and so on), statistical (standard deviation, sum of squares, regression and so on), string and time functions as well as the usual maths and trigonometry.

Array arithmetic is possible too, and the syntax of all the functions follows the well-known *Excel* syntax – in the absence of a *Eureka* manual,



Eureka has all the standard spreadsheet functions

an *Excel* manual suffices. One deviation from *Excel* is that cell references can not be included in formulae by clicking the mouse on the relevant cell – they have to be typed in.

Editing the sheet is quirky, if you compare it with the usual Archimedes style, but it reflects the best practice on other machines. Cut doesn't delete a selected block of data from the sheet – it merely marks it with an outline, ready for clearing, copying or pasting somewhere else. Of course, the package supports multiple spreadsheets in memory, and you can cut, copy and paste between these sheets as well.

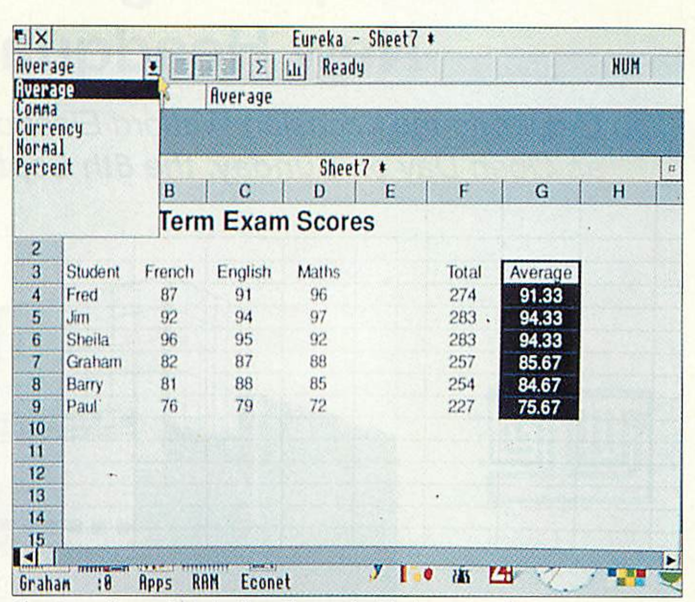
SHOWING SOME STYLE

The styling possibilities in *Eureka* are very strong – there is good control over number formatting, in particular, and the style editor is particularly simple to understand and use. It makes it very easy to present your data, whether textual or numeric, in an attractive and eye-catching way.

The formatting of data on the worksheet is in many ways similar to that in *Impression* – first in the differentiation of global styles and local effects, and second, in the layering of styles. *Eureka* can make full use of outline fonts, and is the first application that can make any use of the kerning data stored in the fonts in the Risc OS 3 Roms. (Kerning is the typographical technique whereby letters such as 'WAV' or 'Ta' are moved closer together to eliminate the overlarge gaps between the characters.)

The style editor is based around a single dialogue box, which controls details of the outline font used, the way that numbers or dates are formatted (including the number of decimal places, currency symbols, red or brackets for negative numbers and so on), the background colours and borders around cells. A 'Normal' style applies right across the sheet – the direct equivalent of *Impression*'s BaseStyle – and can be set up to use an outline font, set the main text size and all the other default functions.

Other styles, a few of which are pre-defined, need only affect one or a few of the attributes – say font or alignment – but nothing else. Undefined attributes are inherited from the underlying Normal style. However, only one style at a time can be lain over the basic Normal one – their effects aren't cumulative, as they are in *Impression*.



Sheets can be made to look really good with the style editor

Each of the attributes of a style can also be changed locally like an *Impression* effect, so a range of cells can be given a grey background without having to define a complete style for it. But if you want to, the Merge Style command creates a new style automatically from whatever selection of effects you have applied to a cell. You can drag the mouse to select a range of cells to apply a style or effect: by CTRL-dragging, you can select several areas of the sheet at the same time before applying a common process to all of them.

The other main area of strength in *Eureka* is the ease of window handling. The main window can be divided into two or four (but no more), with 'splitters' that you can drag out of the corners of the scroll bars: the pairs of sub-windows (panes) scroll together as you would expect. The split windows allow you to keep a 'results' section of a model in view, while you are also working on the data part of the sheet.

The widths and depths of individual rows and columns can be adjusted by just dragging the edges of the row and column labels, and a double-click automatically sets a column to the width of the widest item in the column. This all makes laying out the worksheet terribly easy.

Like all the other main elements of *Eureka*, the macros are based upon those of *Excel*. Macros come in two types – function macros, which are programs to compute something not covered by the built-in functions, and command macros, which are

RISC OS STYLE

One of the first things you notice on firing up *Eureka* is the new window layout. It replaces parts of the normal scroll bars and icons with gadgets of its own. They work the same as the Acorn's, but many of them have a good-looking three-dimensional appearance – buttons really push when you click on them with the mouse. If you have a high-resolution monitor, and use a VGA mode or better, there are high-resolution versions of all the gadgets, and this, combined with the careful shading of many parts of the dialogue boxes gives a very fine and classy overall look.

But there are oddities: in order to allow the splitting of a window, *Eureka* has to implement its own scroll bars. The Risc OS originals are are replaced by plain square 'thumbs', looking like Mac or Windows gadgets, which don't vary in size at all to show the proportion of the worksheet in view. And the whole scroll bar is narrower than usual.

Within dialogue boxes like the style editor (see picture, above), pop-up menus are denoted by a down-arrow icon – for example the colour selector. But these and other menu options that are 'definable', like the list of styles or the typefaces in your system, are presented in scrolling lists, rather than a normal menu with a moving highlight bar. These can grate a bit at first, but they work, and they do prevent the menus building up to unwieldy lengths.

Eureka's behaviour can be decidedly non-Risc OS – clicking on *Eureka* on the icon bar does not create a new sheet, you have to choose New worksheet from the menu. And more seriously, a click on the close box of the main window gets rid of that worksheet. But the close box of the formula window quits *Eureka* entirely!

Grand Opening of Watford Electronics New Headquarters in Luton

To Celebrate the occasion Watford Electronics and Acorn Computers will be holding an Open Day on ***Sunday, the 6th September 1992 from 10.00am to 5.00pm***







Acorn Computers will be using the event to showcase their new RISC based computer

Also on demonstration, along with the complete range of Acorn Computers will be the A4 Notebook Computer benefiting from the power of an ARM 3 processor and RISC OS 3 operating system. Staff from Acorn will be on hand to answer your questions on the new products and everything Archimedes.

Third party software and hardware companies will be well represented, some of the events and guest companies include:

- Acorn Computers
- Aries PC Computers
- The Micro User Magazine (Joint sponsors)
- BBC Acorn User Magazine (Joint sponsors)
- Sales
- Technical Advice
- Education Specialists
- Finance Available

Watford Electronics' own technical and sales support staff will be avilable to offer advice and assistance on the extensive range of products available through Watford Electronics. Come and see our revolutionary new "village" areas in our showroom; dedicated areas featuring products from the leading manufacturers. Educational seminars will be held in the conference suite and theatre.

Some of the many products on show and available for purchase on the day include:

- Printers
- Hewlett Packard Range
- ARM 3 Upgrades
- Multiscan Monitors
- IDE Hard Drives
- Scanners
- Video Digitisers
- Laser Direct Printers
- Cordless Mouse
- Joysticks
- Archi DTP
- Ultimum

Direction to Jessa House from the M1 Motorway:

Exit off junction 11 of the M1 – If coming from south, turn right at the roundabout (under the motorway) or from the north, turn immediate left – Across 3 sets of traffic lights – At the roundabout turn right – Pass the "Do-It-All" store on your left – Over a bridge, across another roundabout – You are now into Dallow Road – After half a mile, you will pass Bestways Cash & Carry on your left – Finway is the first turning on the left after Bestways.

Watford Electronics

Jessa House, Finway (Off Dallow Road), Luton, Beds. LU1 1TR
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sequences of commonly repeated commands.

Typically, you 'record' command macros, and replay them by pressing a single key. However, due to technical difficulties in recording macros in this way with Risc OS, a command macro recorder will not be included in the initial *Eureka* release (this will, be added later). However, you can specify the macros by simply typing them in without executing them, then replay them later.

Function macros will be entered on separate macro sheets: these look exactly like normal worksheets, but the sequence of steps for a function calculation are entered in a single column, like the lines of a program. And there is a full programming language available to play with.

The charting capabilities of *Eureka* were not quite in place for this preview, but it will allow you to drag out an area on the worksheet and embed one of four types of chart – unlike early versions of *Excel* where charts floated in windows that were quite separate from the worksheet. Simple line, bar, scatter and area charts will be possible: the range of styles is similar to *Schema*'s selection.

Unlike the mainstream spreadsheets like *Excel*, *Quattro* and *Lotus 1-2-3*, there's no fancy 3D graphics, though these may appear in a later version of *Eureka*. There will still be a place for the fancier charting packages like Minerva's *Graphbox*.

Another stage in the process: shading picks out the lines

Another limitation is that *Excel*'s annotation layer that allows you to add arrows and notes to charts (and indeed to the rest of the worksheet) will not be a part of *Eureka* at first. *Eureka*'s charts will of course be saveable as *Draw* files.

Integration with the rest of the Risc OS 3 system was not yet complete in the preview copy. Printing support was rudimentary, though the sheet I set up printed out when I pressed the PRINT key.

But you will be able to control all the usual features – whether the grid or the column and row headings print, whether to print the whole or just part of the sheet and so on via a Print dialogue. Plus there will be a useful 'print to fit' option, which sizes the printout to fit on whatever size of paper you have.

Saving is currently limited to *Eureka*'s own file format, but the release version will write text and CSV, as well as DIF and *Lotus 1-2-3* files, which all major spreadsheets support. This will allow the user to transfer data and the majority of formulae from other major spreadsheets, but full macro compatibility is not really possible.

A Eureka spreadsheet window can be split into up to four sub-windows

THE BOTTOM LINE

There is no doubt that the release version of *Eureka* will immediately become my first choice of spreadsheet: it will be a tool I use every day.

The preview copy remained remarkably stable: it crashed only when I tried operations I had been warned would crash, and these known bugs are being removed. It will not work on a 1Mb machine, but 2Mb will be adequate. Certainly, *Eureka* looks better under Risc OS 3 on a high-resolution monitor, but it is perfectly useable on a mode 12 screen too.

It's an intriguing mix of styles, obviously drawing heavily on *Excel* for the Mac but also taking stylistic ideas from *Windows*. On first sight, it may seen more familiar to Mac and PC users than to Archimedes enthusiasts.

Longman Logotron has ambitious plans for *Eureka*: this autumn's release will be only the first step but according to Longman Logotron's Julian Pixton, is aimed at being 'better than anything that's available'.

Free incremental upgrades will add new minor functions, and a major upgrade is already planned for next year – much the same policy as has been followed with *Revelation 2*. At an initial price of around £140, *Eureka* looks like good value, and is certainly one of the two most exciting Risc OS software releases so far this year.

PRODUCT DETAILS

Product: Eureka
Supplier: Longman Logotron, 124 Cambridge Science Park, Cambridge, CB4 4ZS
Tel: (0223) 425558
Machine: Archimedes
Price: £139.82 inc VAT



ArtWorks is a completely new graphics design and illustration tool for the Archimedes. An object orientated drawing program, with ten man-years of development effort behind it, ArtWorks is more than a simple evolution of !Draw included with the machine. It can be used to create illustrations from simple line drawings and cartoons to more complex technical illustrations, to fully coloured and shaded works of art. And it can do this faster, more easily and more efficiently than any other program of its type.

Apple Macintosh users have benefited from programs such as Adobe Illustrator and Aldus Freehand for some years and one of the most popular programs on PCs is the widely acclaimed CorelDraw. ArtWorks acknowledges these industry standards (it can interchange files with them) and we believe offers a superior alternative on the Archimedes platform.



Some special features include:

ANTI-ALIASING



Archimedes owners are used to the advantages of anti-aliased font display, especially in high resolution screen modes. Using our unique variable WYSIWYG control you can vary the screen image from simple and ultra-fast outline only mode, to a fully coloured and shaded display. At the maximum setting ArtWorks anti-aliases all drawings practically removing on screen "jaggies". The effect is similar to having a screen display of several times the actual resolution.

Scale objects by 1 Lines X
Aspect ratio X:Y 100% Lock Y
Foreground 10

THE GRAPHICS

SPEED

Just about the most important aspect of any illustration tool is the speed at which it can display images. ArtWorks is typically 2 to 3 times faster than other drawing programs on the Archimedes. It is up to 10 times faster than the fastest available 486-50 PC with graphics accelerator card.

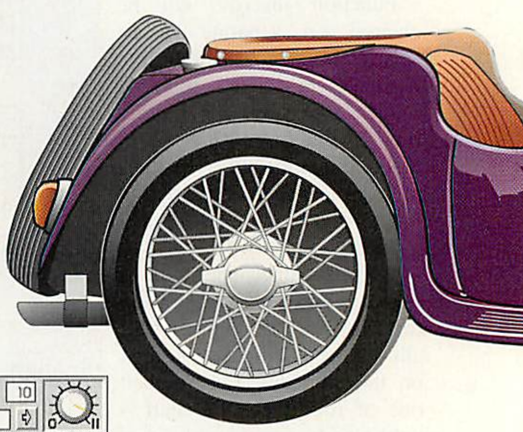
UNDO

This single feature is enough to set ArtWorks apart from other drawing programs, because it allows you to experiment without risk. This aspect, more than any other, enables you to exploit the artist in you because it means you can try something, or even a whole series of operations, and if you don't like the result, then all previous steps can be undone. ArtWorks goes further by allowing just about every operation to be undone (and re-done), by allowing you to control the number of steps recorded, and by even allowing the undo record to be saved along with the drawing.



FREEHAND DRAWING

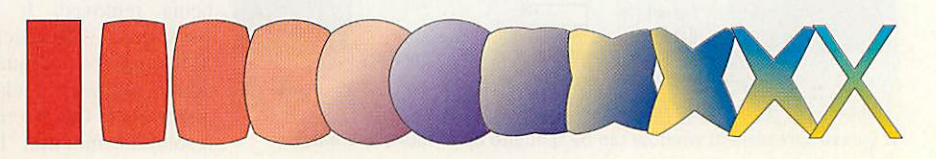
ArtWorks offers a freehand drawing facility so you can draw with the mouse exactly as you would with a pen or pencil. It doesn't matter if the line is uneven since ArtWorks will draw a smooth bezier curve along the line, following your movements as closely as you wish. Combine this with the automatic shape filling (ArtWorks can automatically detect when a shape is closed and fill it with any colour) and the simple and powerful set of curve editing facilities and you have a really simple, fast and intuitive set of drawing tools.



COLOURS AND SHADING

ArtWorks supports 24-bit colour so it can handle more colours than the eye can see. For the advanced user it offers 3 colour models HSV, CMYK and RGB and three colour types - full process colour, spot colours and tints of colours. On-screen colour dithering is used to simulate a large number of colour shades - over 4000 in 16 colour modes and over 100,000 shades in 256 colour modes. This colour dithering system works on all machines even with RISC OS 2.

Two other colour filling tools provide the fastest and easiest possible methods of producing graduated colour fills. Select either the straight or radial graduated fill tool, then just click-drag-release. This single operation lets you set the position of the start colour, the direction and extent of the graduation and the position of the end colour. ArtWorks instantly displays the objects filled with a smooth graduated colour change, and of course you can easily set the start and end colour to be any you wish.





BLENDING
ArtWorks takes this concept much further than any other graphics program by allowing you to blend between shapes with different numbers of points. You can blend from one shape to another to another etc, to create really subtle highlights and colour shading effects. On top of this the blends are dynamic, calculated and drawn on-the-fly. Dynamic blends offer two great advantages: a) blends require practically no memory and b) you can edit the shapes that make up the blend and ArtWorks will instantly re-blend using the new shapes.

PERSPECTIVE
The perspective tool can take any part of the drawing, or the whole drawing, and create an accurate and very realistic three dimensional projection. It shows the two vanishing points and these can even be dragged around the screen to alter the perspective.



Features

- Anti-aliased display
- On screen dithering
- Super fast display and edit
- Multi-level undo and redo
- Import/export files with industry standards
- Spot & process colour separations to any printer
- RGB, HSV and CMYK colour models
- Graduated shading, linear or radial
- PostScript printer and file support
- Multiple drawing layers
- Interactive tool operations
- Freehand drawing tool
- Envelope & perspective object distortion
- Advanced dynamic blends
- Background redraw
- Comprehensive outline text support
- Fully RISC OS 2 & 3 compatible



' Artworks brings out the artist in you '

ILLUSTRATION PROGRAM

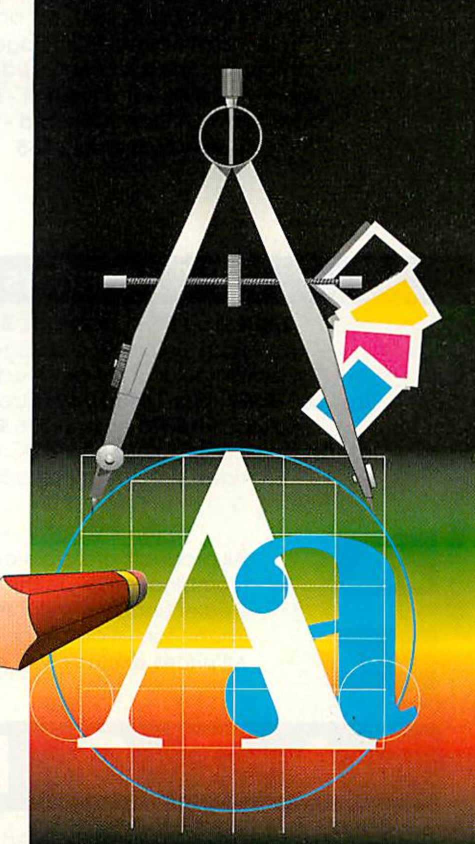


Compatibility
ArtWorks is a fully compatible RISC OS multi-tasking application. It can import and export Archimedes Draw and Sprite files as well as files from the leading illustration packages on other machines.

There is not room here to cover many of the other unique aspects of this software. A more detailed brochure and specification is available for the asking.

Price and availability
Estimated price under £200 +VAT
Available from September 1992

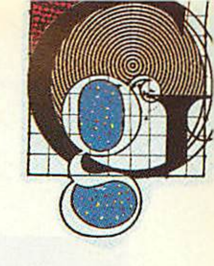
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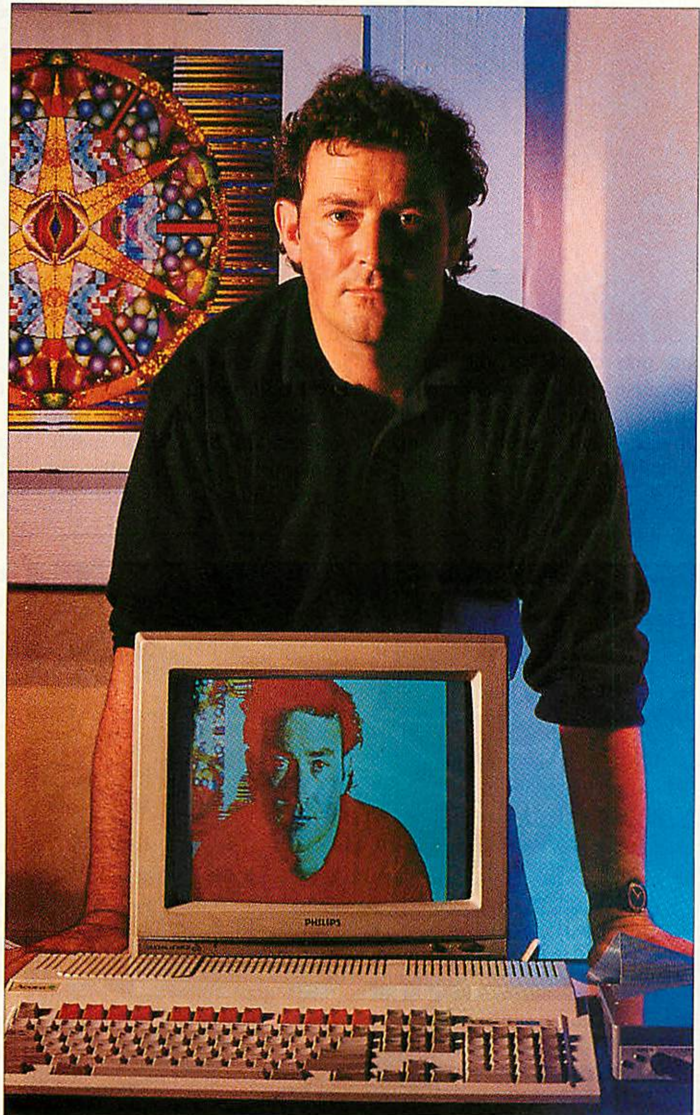
Pete Worrall is a fine artist. His influences lie with the impressionists but his medium is the A3000. He talked to Karen Donaghay and Tony Judge about his work

Mention fine art to most people and they conjure up an image of the eccentric artist, immersed in the the smell of oil paints, living in a separate and rarefied world. Yet art, like many other creative fields, is changing and Peter Worrall, as a 'computer' artist, is just one exponent of the change.

'The art establishment will have to recognise the medium of screen-based work as a valid skill,' he told us. 'The excitement of this new medium lies in speed and creativity. I have produced more screens in three years than could be produced in a lifetime of painting.'

These days, Peter works almost exclusively on the A3000, and a recent exhibition of his work at the Wednesbury gallery in the West Midlands was a showcase for various art packages. Most of the works are produced using not one but several products and Peter maintains that this is crucial to his approach.

'It's the interchange that is important. For instance, *Rev2* has a very good textile-designer panel. It's nice to pick up part of an Arcol image and then do a multi-print using *Rev2*. Or *Artelier* has an excellent outlining option. so I might outline part of the image and put it into *ProArtisan*. Peter does, of course, have his own personal favourites and one of these is *Arcol*.



Peter Worral with his creative medium, the A3000

ROSS VINCENT

'I see *Arcol* as an experimental fine art package. *Arcol* is rather old-fashioned compared to *Rev2*, but it has some special effects that are second to none. One, called anneal, is like an enamel effect, it floats over the surface and cycles through all the colours. *Arcol* can also bleach out parts of the picture using shade, or eat into an image – all with very unexpected results.'

Another favourite is *ProArtisan*. 'It's the speed of colour change that I like. Plus a clinical ability to draw grids.'

But of course the Archimedes is not the only 'creative' machine in the world. Peter described a computer art conference where he was one of the guest speakers:

'They were all on Macs and I, of course, was using the Arc. So they had all been talking about pixels, saying that the state of the art is to get rid of pixels and have smooth photographic quality.

'When my turn came, I held up an image and said that I really liked pixels. Why bother to create something on the Mac that's exactly like an etching? You might as well do an etching.

'They were really amazed at the power and speed of the Arc. It makes the Arc an incredibly creative tool.'

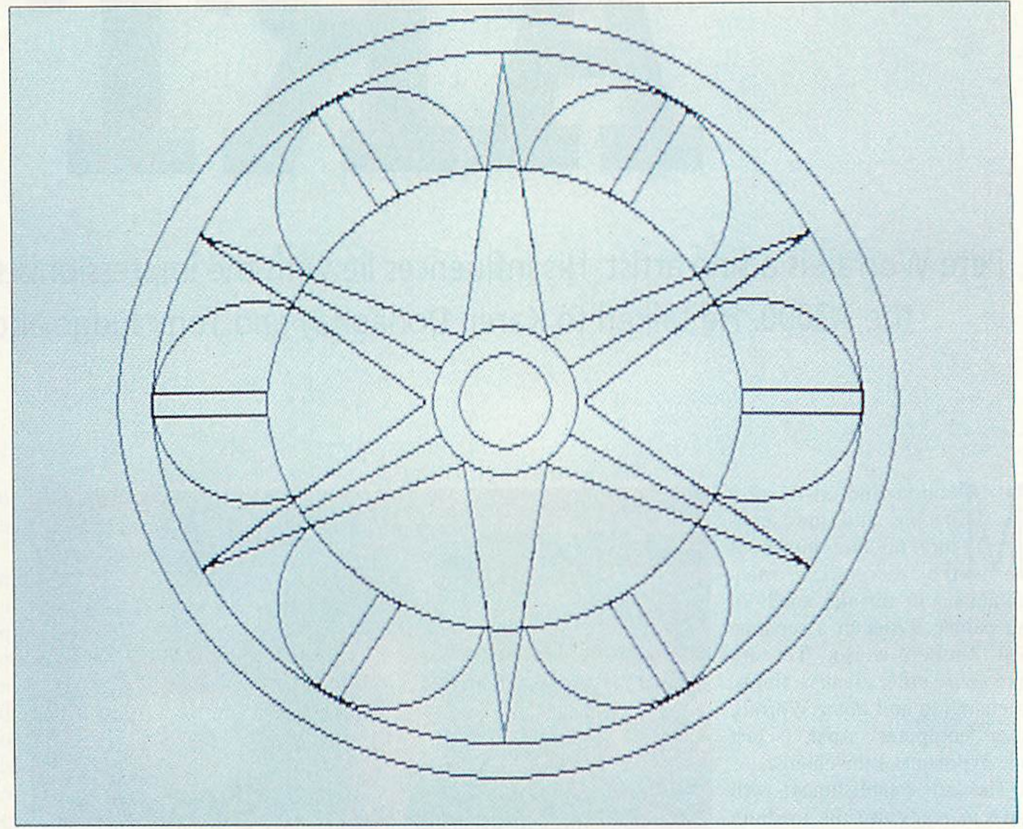
THE MAKING OF KALEIDOSCOPE

We've all seen kaleidoscopes before – they are one toy that never goes out of fashion. But to Pete Worral, a kaleidoscope is more than a toy: it is a creative optical object, capable of stimulating the artistic imagination. 'As a computer artist, the kaleidoscope theme is analogous with a computer screen. In other words, both offer a special kind of vision, which can be manipulated, controlled and viewed in different ways by the user. ' Below Pete explores this theme and explains the creation of one image, using an A3000 computer, a colour laser copier and two popular graphics packages: ProArtisan and Arcol. His objective was to, 'create a dynamic, exciting image', using most of the 256 colours available on the average.

For those who wish to produce similar effects on the Archimedes, *ProArtisan* is available from Clares on (0606) 48511, price £89.36 plus VAT. The lastest version of *Arcol* is called *Arcol Desktop* and is available from ExPLAN UK on (0822) 613868 for £50 plus VAT.

STEP ONE

PROARTISAN GRID



My initial planning was based on pencil and paper drawings for grids or frameworks into which experimental colour-fills could be placed using the *ProArtisan* and *Arcol* programs. The final choice was based on a geometric design using a 1950s kaleidoscope as a model.

I chose *ProArtisan* for the grid because of the clear and logical Banding menu giving measured lines, and the Cut and Paste menu for easy mirror imaging. To begin with, select the Banding menu in Outline shape mode and using the Pop-up gridlock window (setting four), draw the five circles as shown.

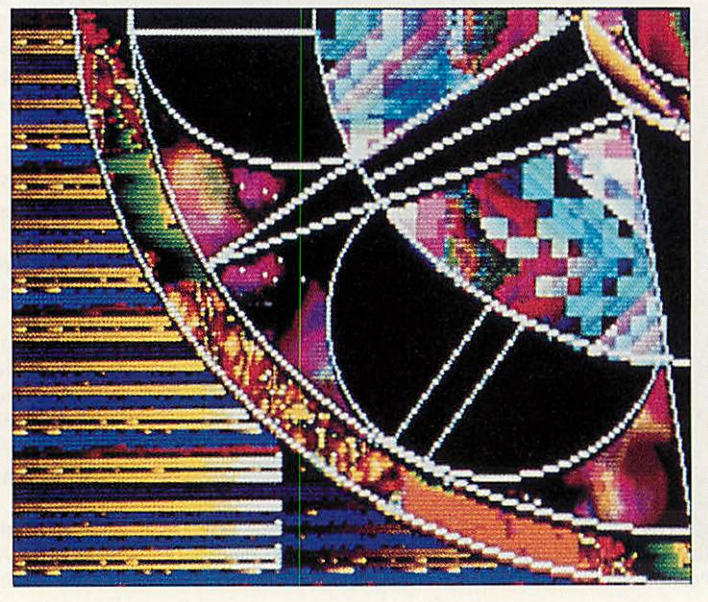
Next, select the square-banded shape to quarter the image, this will help to draw the star, (diagonal lines are also helpful in the construction). Turn off the Pop-up grid-lock window and draw the star shape. Careful aligning of points is required here.

One important point to note is that you only need to work on one corner of the image because the Cut and paste menu can easily mirror-image your creation, using Left/Right and Up/Down flips. The small semi-circle requires some work including Pixel Edit using *ProArtisan's* excellent Zoom function, situated on the *Draw* menu. Remember to save all the stages onto disc as you progress. Altogether this grid took me an hour to produce.

This method can be adapted to create many different variations of this theme and it is worth experimenting . . .

STEP TWO

ARCOL EFFECTS



One of my favorite art packages is *Arcol* because of the experimental 'fine art' Effect and Sprite menus. So, with a blank disc at hand, and *Arcol* loaded, I decided to explore colour and pattern effects.

First of all select Tools and Sketch and draw a few freehand lines in different colours. Next select Sprites and Autocut and cut out a small area of the screen. Now select Effect. You want to find Anneal. This creates an enamel effect, with beautiful moving colour changes: Select or Adjust on the mouse button will cycle different ranges of colours. Shade is also worth trying, because it will bleach out selected parts of drawings (interesting on digitised images). The extensive Sprite effects available also produces excellent results. Save these small 'collaged' cutouts on to a disc (at least fifteen of them) and transfer the *ProArtisan* grid on to the same disc. The next stage involves loading the kaleidoscope grid: the one I prepared earlier!

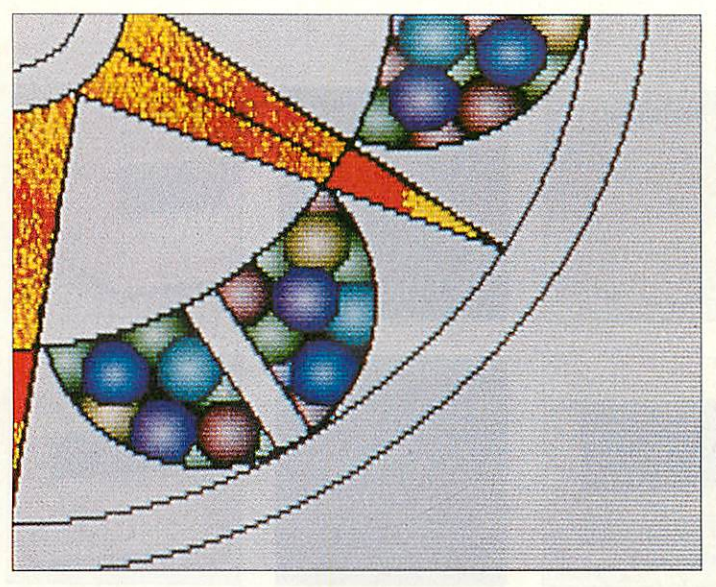
Now you can try out colour fills, using Sprite fill. It is important to experiment, using your artistic license plus the Cut and Paste menu to mirror image the fills.

STEP THREE

PROARTISAN EFFECTS

The finishing touches are very important for contrast and balance. I also wanted to make *Kaleidoscope* look as lively as possible. Using the Draw menu, select a plain colour fill for the star, and use the Pop up Key Colour window to mask the surrounding areas.

Then apply the Spraygun lightly, by dragging the bar to alter the setting, in this case in yellow and red. Remember to switch off the pop-up key colour window after use, selecting X.



Finally the mini-spheres are created using the Circular graduated fills on setting one, with colour sets two to seven. There are 24 colour sets available and the last four enable the artist to design their own colour sets (and save them on to disc. It is important to change the colour set on each application for this function to work properly.

A unique feature available on *ProArtisan* is the Rainbow, multi-coloured brush or spray-can, accessed by using Adjust on draw and spray functions. It is well worth spending time with this function, because it combines the methods I have described above.

STEP FOUR

KALEIDOSCOPE

After a certain amount of trial and error, the artwork is complete. The final result contains 223 colours and satisfies my objectives as a vibrant unique image, using some of the best aspects of two extremely creative art programs.

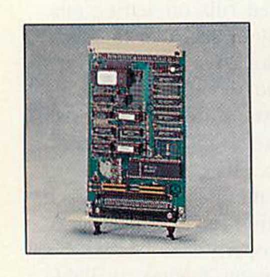
There are infinite possibilities for producing art on the Archimedes through combining processes and using different software.

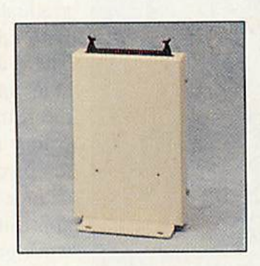
The next stage is to photograph the screen and enlarge the result through a colour laser copier, choosing A4 to A1 in size depending on the image. This gives an accurate depiction of the screen. Then all that is left is to find a frame and some exhibition space. But that's another story . . .

Next month in *BBC Acorn User*, Peter Worrall takes a creative look at video art.



If it's got to work...







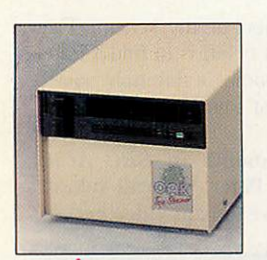




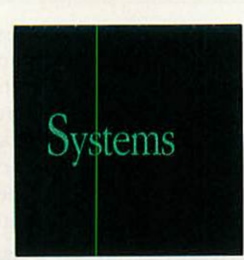














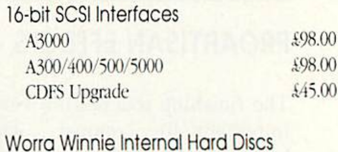


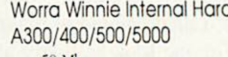


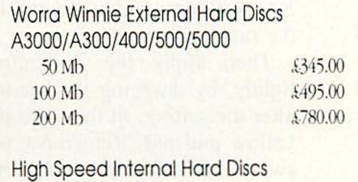


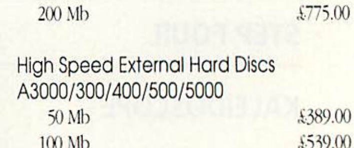


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Prices shown include SCSI interface (except CDROMs which require SCSI card and CDFS upgrade).
Always state computer type when ordering

Prices exclude £10.00 p&p and VAT



The new Worra CD ROM drive offers a low cost entry into the world of multimedia with performance comparable to similar drives. The High Speed CD ROM drive offers the highest possible performance and is better able to cope with more demanding applications, such as Acorn 'Replay' sequences, than cheaper drives.

Each hard disc comes complete with the following FREE software:
Genesis, Euclid, Disc Tree, RISC OS Companion, Worra Battle

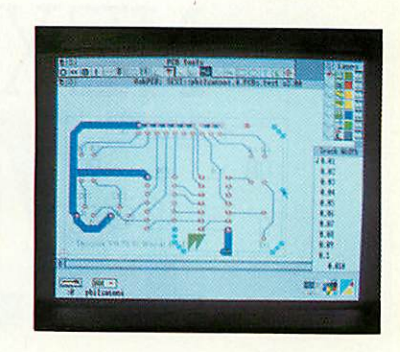
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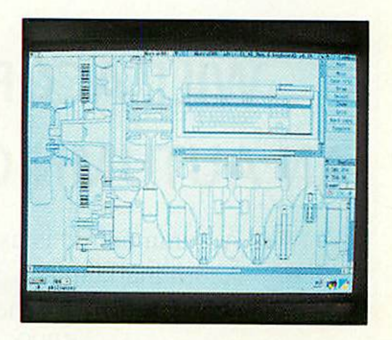
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Oak PCB is a brand new RISC OS compliant PCB and schematic design package. A multi-tasking desktop user interface based on !Draw ensures that users can quickly exploit the powerful draughting features, and create complex multi-layer circuit boards or schematics. Output is to RISC OS printer drivers, or the plotter driver supplied. Features Drawfile import/export, associative editing, drilling data, solder resist etc. etc. Supplied with comprehensive PCB and Schematic libraries.

WorraCAD

£99.95



WorraCAD is the de-facto standard RISC OS 2D CAD package. Working to 18 significant figures precision, WorraCAD provides all the tools required to produce superb accurate technical drawings. Outputs to plotters and RISC OS printer drivers. Features tangents, normals, intersections, parallels, automatic associative dimensions, grid, Drawfile export, linestyles, 16 layers, hatching, mirroring and stretching, CNC link available to Boxford Lathes. Libraries available seperately.

Draw Print & Plot

£39.95



Draw Print & Plot supercedes our earlier plotter drivers for Drawfiles (WorraPlot and ArcSign - upgrades available). DrawPlot accepts drawfiles and creates output on HPGL compatible plotters. Features outline fonts, sprites, filled areas, line thickness and depth sorting to avoid colours overlapping. DrawPrint accepts drawfiles and allows them to be printed to RISC OS printer drivers at a different scale - for example to create huge posters (cropmarks are created automatically).

KiddiCAD

£69.95



KiddiCAD is an exciting 3D building block package designed for younger users. 3D models may be created, using the library of building bricks supplied, and rotated in real time. The high speed of operation and the live 3D view allows users to quickly gain an understanding of work in 3D. Models may be output as Spritefiles in colour or wireframe mode, and can then be imported into painting packages, DTP, Genesis etc.

Leaders in CAD for the Archimedes

prices exclude P&P (£1.50) and VAT



COMPATIBILITY PERFORMANCE

NEXT MONTH

BBC ACORN USER

WILL ACORN LAUNCH AN AUTUMN OFFENSIVE?

The Autumn period is usually a busy time for the Acorn marketplace, with many new products launched in time for the *BBC Acorn User* show. Last year it was the A5000, what will it be this year? We give you up-to-the-minute details in our next issue.

THE EXCLUSIVE SHOW PREVIEW

This year, the *BBC Acorn User* show at Wembley will be bigger than ever. The Acorn market will be out in force, with over 70 companies displaying their wares. But what new releases can you expect to see? We reveal all in our stand-by-stand show preview.

EDUCATION SPECIAL

Big changes are afoot in the education sector, but what will Acorn do to respond to the new challenges? We go behind the scenes at Acorn to find out.

PLUS

BROKEN BEEBS

The BBC micro is renowned as a sturdy machine, but things *can* go wrong. We look at some common faults and tell you how to fix them.

VIDEO WALKTHROUGH

Take a roomful of school children, an A3000 and a camcorder and see what stunning results appear. Don't miss our in-depth video workshop.

TECHWRITER REVIEW

The company who produced *Easiwriter* have now released a new type of package. *Techwriter* has all the features of a normal word processor, but can also cope with mathematical formulae. Is this the package that scientists have been waiting for? We put it to the test.

REGULARS

- All the latest news and views from the world of Acorn
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- Your letters and problems
- Programs galore on the yellow pages and much more

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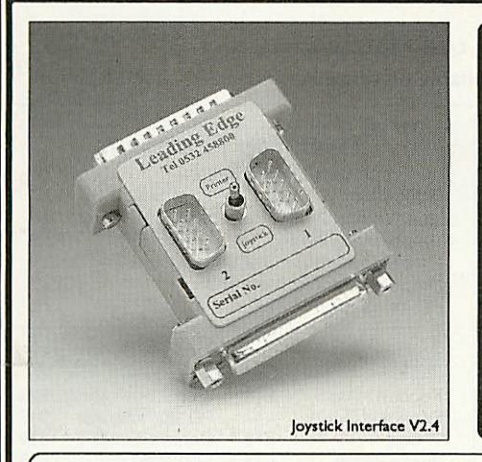
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Leading Edge

The Micro Power Group has now taken over the manufacture and marketing of all current **VERTICAL TWIST** products, under the brand name of Leading Edge. This arrangement will now enable Vertical Twist to apply their outstanding technical expertise on new designs for the Archimedes and to enhance the existing range.



Joystick Interface V2.4

JOYSTICK INTERFACE V2.4

This new version hardware/software package conforms fully to the required Acorn standards, allows one or two standard digital joysticks to be used and is now fully A5000 compatible! No internal fitting, expansion box or backplane is necessary! Compatible with most games on the market!

Hardware/software A5000 **UPGRADES** from the original are available, for £7.99, inc VAT and P&P. Please return both interface and disc to us at the address below with your name, address and remittance.

Now A5000 compatible! Only £34.00!

Joystick Interface EXTENSION CABLE available - Only £6.50

High Quality SCSI CARDS

Internal/External podule for all machines (but not A5000)

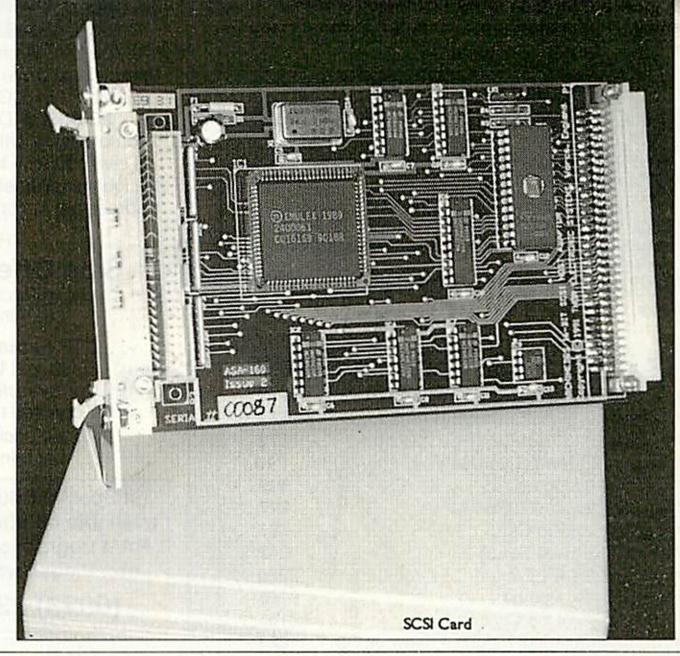
* 8-bit budget card £93.60
* 16-bit High performance card £128.50

A3000 Internal Cards

* 8-bit budget card £93.60
* 8-bit turbo card £128.50

REDUCED!

NEW LOW PRICE!


SCSI Card

Coming Soon!

Schools!

8 Bit SCSI User Port for A3000!

This is an internal 8 bit SCSI card & User Port; so now you can use our MIDI Interface or our MIDI Sampler card, leaving the Econet socket free!

Price £131.87

Other Leading Edge Products

*** A5000 RAM Upgrades**

High quality four layer PCB, easy to fit - slots vertically - no need to remove backplane or hard drive; uses fast DRAM to match your A5000 - 2Mb Upgrade (to give you 4Mb in total) **£112.00**

*** Graphics Enhancer (300/400 series) £225.52**

Adds 24 bit palette and much more! (A3000 .... £235.74)

*** Investigator 2 .... £23.79**

The best selling disc utility package - runs from desktop, installs on hard drive, improved disc editing facilities, more powerful backup features with greater compression and detailed 40 page manual. *(Not A5000)*

*** Tracker £42.51**

Tracker provides 8-track sound sequencing facilities, using the Archimedes sound capabilities to the full. It has many advanced features including:- pitch bend, arpeggio, stereo panning, volume slide, track swapping and mixing.

*** Tracker Tunes (2 - 17 each) £5.00**

Great tunes even if you haven't got Tracker! - Full list available!

*** Sound Sampler/MIDI Card £79.99**

Sounds can be sampled from HI-FI's, or CD players. The card is installed instead of the Econet network card

*** MIDI Tracker £16.17**

Allows Tracker tune modules to be played out of a MIDI interface. Even inexpensive keyboards have the ability to create excellent sounds beyond even the sound quality of the Archimedes.

Leading Edge

Northwood House, North Street, LEEDS LS7 2AA
Tel 0532 458800 Fax 0532 423289

* Carriage contribution £2.50, UK mainland only, excluding Scottish Highlands. Other areas, including overseas, carriage charged at cost.
* Please add VAT at 17.5% to all prices, including carriage
* Please make cheques/P.O.s payable to LEADING EDGE
* Access or Visa cards welcome
* Official education orders accepted; (minimum order value £30.00 for invoicing, otherwise cheque with order).

(Prices correct, E & OE)

All products designed and developed by Vertical Twist

Distribution exclusive to Greyhound Marketing. Dealer enquiries 0532 621111

Watford Electronics

(A member of the Jessa group of Companies – Established 1972)



The sign of Quality

Jessa House, 250 Lower High Street, Watford WD1 2AN, England

Tel: Watford (0923) 237774 Tlx: 8956095 Fax: (0923) 233642

Acorn — The choice of Experience

Shop Hours: 9am to 6pm (Mon.-Sat.) Thursday 9am to 8pm. FREE customer car park.

All prices exclusive of VAT; subject to change without notice & available on request.

Archimedes micro

System	Basic	Mono	Colour	Multiscan
A3000	£599	£665	£759	£924
A3000L/C	£642	£708	£802	£967
A5000H/D	–	–	–	£1499
A5000L/C	–	–	–	£1531

When you purchase an Archimedes Micro from Watford, look what you get FREE with it

Micro	Free Offer
A3000	2Mb RAM; Monitor plinth and Acorn's A3000 Shoulder Bag (carrying case)
A5000	Upgraded to 4Mb RAM & Panasonic KX-P1170 Printer

Archi A4 Notebooks

A4 Notebook with 2Mb RAM	£1399
A4 Notebook 4M RAM/60M HD	£1699

A5000 Hard Disc Drives

A5000 – 100Mb 18mS Hard Disc Upgrade	£269
A5000 – 210Mb 18mS Hard Disc Upgrade	£459

Archi Accessories

- 3.5" 800K 2nd Floppy Drive (305/310) £118
- 5.25" 800K external Floppy Drive £85
- I/O Podule (Analogue/User/1MHz bus) £79
- I/O Podule (Analogue/User) £49
- MEMC 1A Upgrade £29
- MIDI add-on to I/O Podule £27
- MIDI Expansion Card £65
- Econet Network Board £42
- Archimedes IEEE Interface Adaptor £269
- Dual RS232 Podule £195
- 16 bit parallel I/O Card £195
- Archi replacement mouse – New design £29
- PC Emulator v1.8 £85
- Software Developers Toolbox £149
- Floating Point Unit £455
- SCSI Adaptor Expansion Card £156
- Keyboard Extension Lead £6
- 2 Podule Backplane £20
- 4 Podule Backplane £25
- Fan for above backplanes £10
- Risc Os Extras Software Disc £5
- Ethernet Card £220
- SCSI Card 8 bit £129
- A5000 – 2 to 4Mb RAM Upgrade £92

A3000 Accessories

- 3.5" External Drive £95
- Monitor Stand £15
- Technical Manual £39
- Serial Upgrade £19
- A3000 Dust Cover £5
- A3000 plus Monitor Dust Cover £9
- A3000 User Port/Midi Upgrade Card £44
- A3000 User/Analogue/IIC I/O Card £42
- A3000 External Podule Case £15



CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 250234 or 233383

Archimedes Hard Disc

Watford's ST506 Hard disc drives for A310 & A410 series fit internally into the space provided.
P.S. A310 upgrades require a backplane and a fan.

- **3HDP** – Hard Disc Podule only £99
- **3HD20** – 20Meg H' Disc + Podule for 310 £195
- **3HD40** – 40Meg H' Disc + Podule for 310 £285
- **3HD50** – 53Meg H' Disc + Podule for 310 £359
- **4HD20** – 20Meg Hard Disc for 410 £69
- **4HD40** – 40Meg Hard Disc for 410 £195
- **4HD50** – 53Meg Hard Disc for 410 £260
- A3000 20Meg Hard Disc + Podule £279
- A3000 40Meg Hard Disc + Podule £379

Archimedes A3000 Desk Top Publishing (DTP) Sale Offer

A3000 BBC Archimedes Micro with 3.5" Floppy Disc Drive and a mouse, upgraded to 2Mb RAM, COLOUR Monitor + Lead, 20Mb fast IDE Hard Disc Drive, 'Compression' Utility to increase the Hard Drive capacity to Typically 40Mb, The highly acclaimed Computer Concept's Impression Junior DTP software package.

RRP: £1299

Sale Offer Price: £875

Above Package plus Acorn's Learning Curve **£918**

NEW — DTP Package as above but with a 30Mb fast IDE Drive, (with Compression utility, the capacity is increased to typically 60Mb) **£899**

Above package with Acorn's Learning Curve **£942**

Special Education discounts available on above package, micros, RAM upgrades, ARM 3 Turbo Card, etc. Please write in or telephone: (0923) 237774/250335

Archimedes RAM Upgrade

All our memory upgrades are simple to fit. No soldering required. Fitting instructions supplied.

- **R300**-4 Layer RAM upgrade board (Bare). £25
- **R302**-A3000 – to 2MB RAM Upgrade £36
- **R303**-A3000 – to 2MB RAM Upgrade (expandable to 4MB) £55
- **R304**-A3000 – to 4MB RAM Upgrade £125
- **R311**-A305 – to 1MB RAM Upgrade £30
- **R312**-A305/310 – to 2MB RAM Upgrade £99
- **R314**-A305/310 – to 4MB RAM Upgrade £199
- **R412**-A410/1 – to 2MB RAM Upgrade £30
- **R413**-A420/1 – to 4MB RAM Upgrade £60
- **R414**-A410/1 – to 4MB RAM Upgrade £90
- **R810**-A410/1 – to 8MB RAM Upgrade £579
- **R820**-A420/1 – to 8MB RAM Upgrade £549
- **R840**-A440/1 – to 8MB RAM Upgrade £479
- **R814**-R140 – to 8MB RAM Upgrade £499
- **A5000** – to 2MB additional RAM Upgrade £85

Lease Purchase facility now available. Please telephone or write in for details.

Desk Top Publishers

Acorn's Archi DTP Package	£79
• Equasor £39; • Expression-PS	£19
Impression 2 DTP Pack	£123
Impression Junior	£69
Impression Business Supplement	£39
Impression II Borders Disc	£19
Tempest DTP Package	£90

Archi Wordprocessors

Pendown Archi	£48	Archie Spell Master	£25
Pendown Outline Fonts	£18	PD Spellchecker	£40
Image Writer	£25	Graphic Writer	£19
1st Word Plus – 2	£63	EasiWord	£18

Databases

AlphaBase	£36	Magpie	£40
Flexifile	£79	Multistore v2.01	£176
Knowledge Organiser	£42	Pinpoint	£65

Spreadsheets

Intersheet Disc	£24	Schema	£89

Business Graphics

GammaPlot	£39	Sigmaplot	£39
Interchart Disc	£17		

Integrated Packages

- Pipedream 4 £149
- Desktop Office – Database, Graphs & Charts, Wordprocessor Spreadsheet, Communications £98
- Desktop Folio – Wordprocessor, Desktop & Interactive Publishing. Ideal for school £75

A3000 I/O Card (User, Analogue & IIC)

This NEW versatile I/O Card from Watford, fits inside the A3000 and includes an Analog to Digital Converter, a User Port, and an InterIC (IIC) connector.

The card allows many of the peripherals developed for the BBC to be used with the Archimedes A3000. The ADC and User Port have the same pin out and connectors as the BBC computers.

Extensive RISC OS software is supplied to provide BBC OSBYTE calls for support of the ADC and User Ports, including the BASIC keyword ADVAL. The software provides extended RISC OS support for separate interrupts from both the ADC and User Ports, permitting easy interrupt driven operation.

The card is provided with all the software in ROM and is automatically loaded when the machine is turned on.

Peripherals connected to the ports can obtain up to 500mA of power at +5V. A fuse is fitted to the card to protect the A3000 from damage arising from accidental short circuit of the power output.

The card is provided with an extensive manual explaining installation, all software commands, connector pin outs, hardware addresses and example programs.

Features

- An 8 bit User Port with a standard 20 way IDC connector, compatible with the User Port on the BBC computers and the Archimedes I/O Podule.
- A 10 bit Analog to Digital Converter with a standard 15 way D type connector, compatible with the ADC on the BBC range of computers and the Archimedes I/O podule.
- An InterIC (IIC) Port with a 5 pin DIN socket to connect the A3000 to external IIC devices.

£42

More Archimedes Products See Pages 3, 4, 5, 6, 7, 8

Hi-Speed, Low Cost Archi Hard Disc Drive

Watford's advanced interface allows IDE drives to work on any Archimedes machine, speeds in excess of SCSI devices can be obtained at a fraction of the cost of a SCSI drive.

Up to four drives are supported by the IDE filing system IDEFS, up to two drives can be attached to each expansion card, up to four cards can be installed in a machine. An optional 20Mb or 40Mb hard disc can be supplied on the podule expansion card itself, with its fast transfer rate and power saving modes the drive is ideal for storing commonly used software such as the !Fonts application.

A powerful security feature has been provided with the two unique commands *IDELock and *IDEUnlock, ideal for educational establishments where hacking or tempering may be prevalent that may lead to loss of data. Once locked, the configuration can not be changed until a secret password is used. The !IDEForm Write Protect option is particularly useful in conjunction with *IDELock as it will prevent any unauthorised deletion of data.

By an innovative use of on-board memory, the card will remember its configuration, even if moved to another slot or even a different machine, this also includes the unique security features.

Hardware

- Single width EuroCard
- Supports proposed ANSI ATA (IDE) specification
- Fast 16 bit MEMC interface interrupt driven to support background disc operations
- 5 Mbytes per second peak transfer rate
- Built in Non Volatile RAM to hold configuration
- LED activity indicator
- 37 way D type socket for external drives
- Optional on-card 20Mb or 40Mb hard disc
- Up to two drives (master and slave) per card
- Multiple cards per machine (up to four)

Software

- Conforms fully to the Acorn IDE Specification
- All software supplied in ROM
- Filing system 'IDEFS'
- Desktop filer with drive ready detection and disc name under icon
- !IDEForm, WIMP based configuration and formatting software
- Drives can be individually write protected
- Up to four drives over multiple cards
- Power saving standby modes supported with configurable timeout
- Drives can be used without translation in native mode for minimum overhead
- !IDEFSDisk, creates PC emulator hard discs

Prices

Part No.	Capacity	Access Speed	Price
ADA 0520	44Mb	28mS	£215
ADA 0530	100Mb	16mS	£295
ADA 0570	200Mb	15mS	£479
ADA 0580	330Mb	15mS	£849

All the above 3.5" hard drives are supplied complete with Controller Card, cable & Software on ROM. (Internal fitting). For use with A300/A400/A500 series machines.

For A3000 users an additional external Case and PSU will be required.

AAA 0300 External Case & PSU for A3000 £85

Internal Hard Disc Drives for A3000

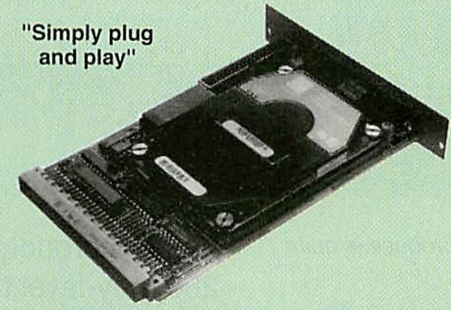
State of the art, 4 layer internal IDE Hard Cards for the A3000. Software supplied in, On-board ROM.

ADA 0700	21Mb	23mS	£185
ADA 0770	30Mb	19mS	£285
ADA 0720	44Mb	19mS	£349
ADA 0750	60MB	18MS	£399
ADA 0730	89Mb	18mS	£619

Supplied ready assembled. No soldering required. Simply plug into the allotted space.

Archi IDE Hard Cards

"Simply plug and play"



Watford's easy to instal, low cost, high performance, revolutionary IDE Hard Cards for the A300 & A400 series Archimedes.

ADA 0650	21Mb	23mS	£199
ADA 0800	30Mb	19mS	£295
ADA 0660	44Mb	28mS	£359
ADA 0810	60Mb	18mS	£409
ADA 0670	89Mb	18mS	£629

(Can be used as a Removable Hard Drive)

NEW Archimedes A300/A400 SCSI Hard Disc Offer

(while stocks last)

100MB Hard Disc Upgrade complete with Controller card, Cables, Formatter and Manuals

RRP: £799

Offer Price: £325

Syquest Removable Disc Units

These Hard Drive units are supplied complete with a cartridge 42Mb removable, cables and a high flow fan for cooling.

- Syquest Drive Unit pack £399
- As above + SCSI Card £415
- Spare 42Mb Disc £55

Archi to BBC Serial Link Mk 2

Using this simple data link, it is possible to solve all your BBC to Archimedes data transfer problems. The kit is supplied with a disk, and the necessary cable to connect the two computers.

New RISC OS Version also available (please specify)

- For A3000 £15 • For A5000 £16

For A3000 Serial Upgrade (£19) required

BBC MASTER

MASTER 128K Micro incl. Acorn's View, Viewsheet, ADFS, BASIC Editor & TERMINAL plus FREE OFFER (see below) **£399**

FREE with every BBC Master purchased from us during August

A 5.25" Double Sided, 40/80 track switchable 400K Disc Drive complete with cables and a Utilities disc incl. 2 games, plus

Gemini's OFFICE MATE & OFFICE MASTER

Add-Ons & Accessories

Econet Module for the Master		£42
Twin ROM Cartridge for Master		£9
Quad ROM Cartridge for Master		£14
Master Reference Manual I	(No VAT)	£14
Master Reference Manual II	(No VAT)	£14
Master Advance Ref Manual	(No VAT)	£14
64K Upgrade Kit for B+		£32
Acorn 1772 DFS Kit complete		£49
ECONET Upgrade Kit for BBC B		£42
ALL ECONET UPGRADES Available		
ARIES' IEEE Interface for BBC B & Master		£238
Morley Teletext Adaptor with ATS Rom		£99
Ecolink		£270

Minerva's Archimedes Software

EasyWord	£18	Time Tabler	£549
Home Accounts	£35	System Delta	£59
System Delta Program Reference Manual			£29

Stand alone Business Accounts Packages

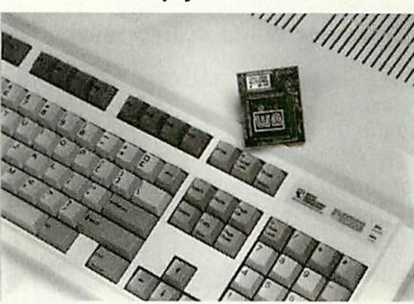
Sales; Purchase; Order Processing and Invoicing; Nominal; Stock management

£79 per module

or Complete Business Package **£325**

ARM 3 Turbo Card MkII

Simply The Best



Here it is at last – the all new Mark 2 version of Watford's highly acclaimed ARM 3 processor board for the Archimedes and now also the A3000 series computers. Using the latest surface mount technology on a high quality four layer circuit board we have reduced the overall size to a mere 53mm x 45mm, and the cost to only £169. Mk II upgrade will increase the speed of your micro by a factor of 3 to 6.

Any competent A300 or A400/1 series micro owner can fit the upgrade himself, as we provide full fitting instructions and a special ARM chip extraction tool. However for A3000 micros and those not wishing to perform the upgrade themselves, we will collect, upgrade and return your micro by courier service, at an additional cost of £18.

(A300 and old A440 series owners please note – you will need to upgrade to MEMC1A for ARM3 to work.)

RRP £249

Offer Price £169

Acorn have satisfactorily evaluated Watford's ARM 3 upgrade and the A3000 upgrades are fitted by Acorn approved surface mount technology centre, therefore its fitment will not invalidate Acorn's warranty on the micro.

Z88 Portable Micro



- Z88 Portable Micro £179
- 32K RAM Pack or 32K EPROM Pack £16
- 128K RAM Pack or 128K EPROM Pack £32
- 512K RAM Pack £86
- 256K Eprom Pack £55
- Z88 Eprom Eraser Unit £38
- Z88 Carrying Case £8
- AA Nicad Rechargeable Battery £1.50
- Battery Charger Compact & Fast £6
- Z88 Serial Printer Cable £8
- Z88 Parallel Printer Cable £18
- Z88 to Archi Link £15
- Z88 to BBC Link £8 • Z BASE £56
- Z88 to PC Link II £27 • Z88 to Macintosh £32
- Z88 Mains Adaptor £9 • Z88 Modem £114

Continued→ → → → → → → → →

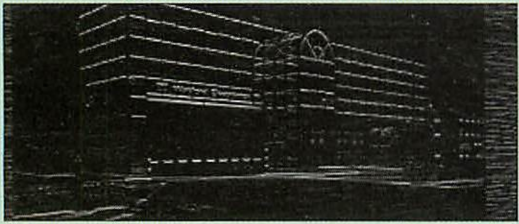
SCANNING ON THE ARCHIMEDES WILL NEVER BE THE SAME

"The image quality which this little beauty can produce is quite stunning."
Archimedes World – July 1992

"Other Arch image grabbers have been irritating or just plain useless..."
"Loads of well written, easy-to-follow and in-depth help, all glued together in a very handsomely designed manual."
Computer Shopper – July 1992



Original Image, 16 Grey Levels



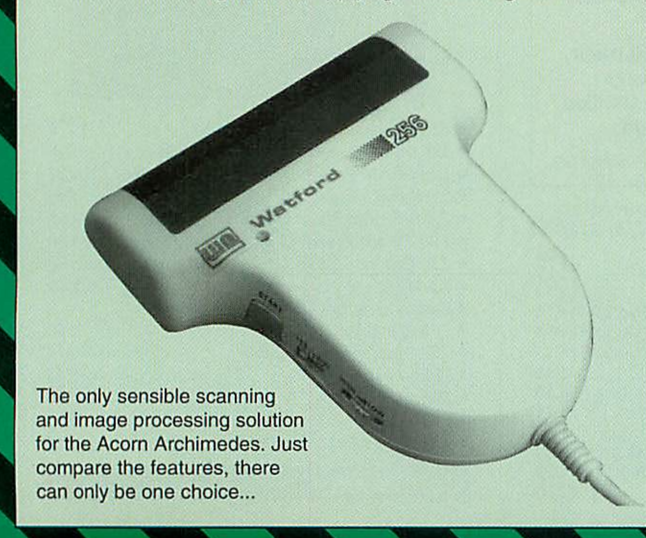
Original after edge filter applied



Original after applying an enhancement filter



Original after applying a smoothing filter



The only sensible scanning and image processing solution for the Acorn Archimedes. Just compare the features, there can only be one choice...

Watford proudly introduces its innovative new 256 grey-level hand scanner, **Scan256,** for the Archimedes range of micro computers. It offers up to 256 grey levels at a maximum of 400 dpi, and comes complete with the most advanced and sophisticated 256 grey scale scanner software currently available for the Archimedes.

Features

- **Multiple copies of the image in memory at once**
  Allows multiple consecutive operations without having to save the original image to disk.
- **Instant re-draw of all 4 image buffers**
  No re-calculations needed unlike other packages that use on the fly screen-dithering.
- **Highly advanced dithering and image size reduction**
  Available via industry standard ChangeFSI package for maximum image quality. An invaluable aid to reduce the size of the image whilst maintaining maximum image quality.
- **Advanced in-built image processing options**
  Convolution digital filtering fully implemented with over 100 filters covering edge detection, image enhancement and image smoothing. Enables high quality images to be obtained from poor quality scans.
- **A unique L.E.D. indicator on the scanner**
  Shows you when the scanner is being moved at close to the maximum scanning speed, not just when it is too late and a scan line has been missed by moving the scanner too fast.
- **Fully adjustable scale and size of image preview when scanning**
  Image preview window can even be behind other windows and preview is shown in real-time with maximum number of grey scales available.
- **Support for 'The Serial Port' Graphics Enhancer**
  Allows up to 256 simultaneous grey scales on screen at once.
- **True brightness, contrast and gamma correction**
  All can be specified by a value to exactly match monitor/printer. No guessing with shapes of curves and correction is mathematically correct.
- **RISC OS 3 features**
  Include rotation and shearing. Scans normally are scanned at a slant rather than being rotated, shearing enables the scan to be corrected better than rotation.
- **Fast RISC OS printing**
  Multiple options such as scale to page, centre, sideways, selected area, and any scale.
- **Scanner scans at an amazing 3ms per line**
  A post card at 400dpi takes only 7.3 seconds to scan, creating over 3Mb of data.
- **Selectable scanning modes**
  256 grey-scale, 256 grey-scale half width, 16 grey-scale and monochrome scanning modes. Half width mode enables longer 256 grey-scale scans to be achieved.
- **Save image in foreign formats**
  Save as industry standard TIFF for exporting to other systems, AIM for further processing, or RISC OS Sprite format.
- **Single width, high quality podule using surface mount technology**

Scan256 Scanner, Interface Card, Software and Manual

Only £185

BBC Educational Software

- Maths with a Story 1 (Disc). 4 primary level maths programs £20.00
- Maths with a Story 2 (Disc). 4 further maths programs. £20.00
- Picture Craft (Disc) 6-14 age group. Pack consists of flexible geometrical design & colouring programs. £17.00
- Computers at Work – Primary £17.35
- Espana Viva – 3 Discs £19.95
- WHITE KNIGHT Chess game £16.00
- A Vous La France £29.00
- Six French Games – Aimed at pupils in their first year of French, but also useful as revision for more advanced students 11 years+ £26
- More French Games – Another 6 games 12 years+ £26
- Au Restaurant and Accident de Route 12 years+ £26
- Boulogne and Oh-Les – 2 programs for beginners £26
- Letters to French Penpals – 11 years+ £26
- French Programs with Henri Beret – The programs in this series present vocabulary, grammar and role-play phrases in the form of animated games. 11-16 £22
- Six German Games – Aimed at pupils in their first year, but useful as revision for more advanced student of German. 12 years+ £22
- More German Games – Aimed at pupils in their 2nd year of learning German. 12 years+ £22
- Computer Control – This is a package of 3 programs simulating control of a greenhouse, a robotic arm & a chemical plant. 14-16 years £26
- PUNCMAN Learning punctuation
  Puncman 1 & 2 for 7 – 13 years £15
  Puncman 3 & 4 for 8 – 14 years £15
  Puncman 5, 6 & 7 for 8 – 15 years £15
- Yes Chancellor – A chance to take over number 11 at Downing Street. 12 years+ £18
- Letters & Pictures – Introduces phonic skills to Infants 6-8 years £15
- Numbers & Pictures – Early number learning is a great fun (4-6 years) £15
- Note Invaders – Budding musicians can learn the notes on the Clef with this elegant game 3 programs (7 to Adults) £15
- Maps & landscapes No. 1 (9-14 years) £18
- Help Your Child learn Basic Map work No. 2 (9-14 years) £18
- Spelling Week by Week (6-14 years) £18

Archi Educational Software

- Animated Alphabet (3-6 yrs) £21
- Arcventure (8-12 yrs) £29
- Bookbinder £43
- Bumper Disc £14
- Bumper Disc 2 £14
- Craftshop 1 £26
- Craftshop 2 £26
- Converta-Key £16
- Data Word £16
- Desktop Stories £35
- DigiSim £35
- Dream Time (5-7 yrs) £23
- Farm (5-7 yrs) £19
- Fleet Street Phantom (9-13 yrs) £25
- Fun School 3 Red (up to 6 years) £17
- Fun School 3 Green (6-8 years) £17
- Fun School 3 Blue (8 years +) £17
- Gate Array Teaching System £68
- Glimpse Clip Art Utility (7-16 yrs) £8
- Highlighter (6-16 yrs) £42
- Jigsaw £28
- Mapventure (9-13 yrs) £24
- Microbugs £24
- Money Matters £16
- Nature Park Adventure (7-9 yrs) £27
- Numerator £60
- Picture Book £16
- Recall (6-13 yrs) £39
- Sellardore Tales £24
- Snippet £26
- Space Mission Mada (9-13 yrs) –
- Sting of the Dump (9-13 yrs) £22
- Target Maths £16
- Viewpoints (9-12 yrs) £33
- Wizard's Revenge (7-10 yrs) £17
- Worst Witch (7-10 yrs) £25

Archimedes Software

GRAPHICS

3D Construction Kit	£39
Arc Light	£46
ARCtist	£19
ARCticulate	£19
Atelier	£65
Artisan II	£45
Artisan Gallery	£16
Autosketch II	£65
Craftshop 1 & 2	£28
Euclid 2	£50
Graph Box	£59
Graphbox Professional	£107
HotLink Presenter	£40
Illusionist	£69
Kermit	£46
Mogul	£17
Poster	£79
Pro Artisan	£70
Prime Art	£69
Render Bender 2	£95
Revelation 2	£80
Snippet	£21
Titler	£119
Tween	£29

GAMES

Air Supremacy	£17
Apocalypse	£14
Arcade Soccer	£14
Avante Garde Fonts	£23
Boogie Buggy	£14
Break 147 + Supa Pool	£19
Bughunter in Space	£13
Cataclysm	£19
Chess 3D	£14
Chocks Away 2	£14
Chocks Away Extra	£14
Conqueror	£15
Corruption	£18
Cyber Chess	£38
Elite	£33
Enter the Realms	£19
E-Type Compendium	£20
E-Type Designer	£19
Family Favourites	£13
Grievous Bodily Arm	£19
Holed Out Designer	£13
Holed Out Golf Comp	£20
Hostages	£14
Inter Dictor 2	£26
Iron Lord	£15
Jigsaw	£27
Lemmings	£20
Lost Temple	POA
Mad Prof Mariarti	£17
Masterbreak	£16
Man at Arms	£14
MahJong Patience	£15
Manchester United Europe	£19
Mig 29	£24
Nebullus	£21
Nevryon	£14
Olympics	£14
Pandoras Box	£18
Pipe Mania	£17
Power Band	£14
Puncman 1 & 2	£16
Puncman 3 & 4	£16
Pysanki	£14
Quazer	£10
Real McCoy	£22
Real McCoy 2	£23
Redshift	£14
Return to Doom	£16
Repton 3	£14
Saloon Cars Deluxe	£27
Spitfire Fury	£22
Splice	£25
Sporting Triangles	£24
Superior Golf	£14
Superpool + Break 147	£19
Swin	£22
Talisman	£12
Timewatch	£24
Trivial Pursuit	£22
Twin World	£15
U.I.M.	£23
White Magic 2	£15
Wimp Game	£13
Worldscape	£16
XFire	£19
Zelanites	£23

Miscellaneous

Ancestry	£59
Arccomm 2	£38
Arcterm 7	£64
Armadeus Sound	£60
BBC DFS Reader	£6
Broadcaster Loader	£65
Compression (CC)	£38
Equasor	£38
FlexiFile	£97
Genesis Plus	£68
Genesis 2	£99
Investigator 2	£22
JX Archi Colour Printer Driver for Citizen & Star Printers	£15
Magpie 2	£42
Notate	£42
Numerator	£66
Pin Point	£65
Presenter 2	£29
Presenter Story	£145
Rainforest	£17
Revelation 2	£95
Rhapsody in Blue 2	£45
Score Draw	£46
Show Page	£127
Speech!	£15
SWIV	£19
The Victorian	£17
Time Tabler	£549
Toolkit (Clares)	£35
Touchtype	£40
Tracker	£39
Turbo Driver BJ10E	£42
Vox Box	£46
WorldScape	£17

LANGUAGES (Archimedes)

ISO-PASCAL; FORTRAN 77 £77 each
Assembler; LISP; Prolog X £149 each

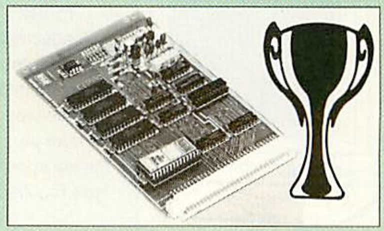
ANSI C Rel. 3	£125	Logotron Logo	£45
Macro Assembler	£40	Risc Basic	£120
Robo Logo	£69	Risc FORTH	£110
BASIC Compiler	£77	Cambridge Pascal	£95

Archimedes External Disc Drive Interface

With this interface it is possible to connect almost any 5.25"/3.5" disc drive with its own power supply to the Archimedes. Upto 4 disc drives can be connected. Fully Buffered Board. NO SOLDERING is involved. Supplied complete with necessary lead. **Price £21**

Back Plate Extension
- A300/400 £15;
- A300 £14

Archi Real-Time Digitiser



Now supplied with NEW RISC OS Version Software

Watfords' Archimedes Video Digitiser is the most sophisticated digitiser ever designed for a micro. It provides a fast and flexible means of capturing images from a video camera or recorder for display and manipulation on the Archimedes range of Micros. Off-air televison signals may also be digitised via a video recorder or TV tuner. Please write for further details.

Price £119

A Set of Colour Filters for colour image grabbing using a video camera £16

Archi Graphic Tablet



The Archi Graphic Tablet offers performance and accuracy comparable to other tablets priced at well over £400, and has the useful addition of a liftable cover, which can hold tracing material or menu templates securely. The package is supplied complete with sophisticated Archi software. (Now, fully LinCAD compatible. Recommended by Linear Graphic for use in Education).
(FREE this month, PC Mouse Drivers & Art package)

Special Price £199

(Price includes Tablet, Leads, Software & Puck)
Stylus Optional Extra **£20**

Archi Graphic Tablet Junior. Working area 9" x 6". Price includes Stylus **£125**

Surge Protector Plug

Fitted in place of your normal mains plug, this device protects your equipment (and data from corruption), against mains high voltage translent spikes/surges caused by lightning or thermostats switching.

Protection for only **£8.50**

4 Way Mains Distribution Socket



4 way top quality mains trailing sockets.
Supplied wired up with mains plug ready for use.
Can be screwed to floor or wall if required.
Very useful for tidying up all the mains leads from your peripherals.

£9.50

Aries Spike Cleaner Unit

A 4 way mains distribution unit as above with a built-in Surge Arrester, providing protection for your complete Computer/Hi-Fi System

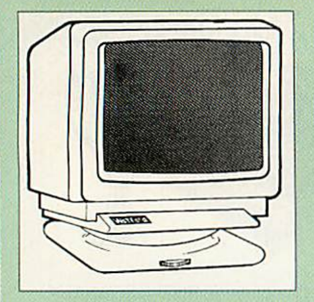
£16

8 Way DIP Switch

Increase the speed of your Disc Drives by soldering this switch to your BBC B or B+ keyboard

Only **£1.00**

Continued→ → → → → → → → → →



FREE Connecting lead with every monitor purchased from us. Please specify type required.

Microvitec Monitors

• **1431** – Standard Resolution Monitor	£169
• **1451** – Medium Resolution Monitor	£209
• **Cub3000** Medium Res for A3000	£189
• Dust Cover for Microvitecs	£5.50
• **Touchtec 501 Touch Screen**	£239

Now 3 years Parts & Labour warranty on all Microvitec Monitors

Multiscan Colour

• Eizo 9060S	£389	• Taxan 770LR	£362
• Eizo F550i	£719	• Taxan 775	£362
• Eizo T560i	£995	• Taxan 787	£249
• NEC 3FG	£370	• Taxan 795	£397
• NEC 4FG	£465	• Taxan 875	£679
• NEC 5FG	£850	• VIDC Enhancer	£25
• NEC 6FG	£1525		

Aries AlphaScan Monitor

Pound for Pound, the AlphaScan VGA Multiscan monitor provides the maximum performance and greatest flexibility of any 14" colour monitor for the Archimedes micro.

Its multiscan circuitry provides automatic adjustment for frequencies between 30 and 60KHz horizontal, and 50 and 90Hz vertical. Its 0.28mm dot pitch high resolution tube provides super sharp text graphics, while a high speed (70/72Hz) refresh rate provides a flicker-free display easing the eye strain. The Multivideo VIDC Adaptor supplied (free) with the monitor allows high resolution operation in all screen modes.

£325

Philips Monitors

• **BM7502** 12" Hi-res Green Monitor	£67
• **CM8833** 14" Med. Res Colour Monitor	£172
• Dust Cover for Philips Monitors	£6

STAR BUY
Aries A2000 Colour Monitor

This attractively finished, etched screen medium res monitor is supplied complete with built-in speaker, volume control and video input. All controls are located on the front panel for ease of use. Ideal for BBC, BBC Master, Archimedes and Amiga.

Only £159

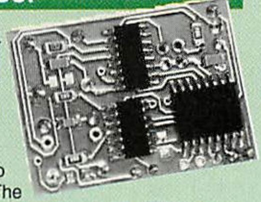
Spare Monitor Leads

BNC Lead for Zenith or Philips	£3
Skart Monitor Lead	£5
RGB lead for TAXAN Monitors	£3
Archimedes Colour Monitor Lead	£7.50

Roland Plotters

• DXY1100	£490	• DXY1200	£620
• DXY1300	£825	• DXY2500	£2345
• Sketchmate A3	£499	• Sketchmate A4	£308
• Roland plotter Pens, Fibre tip	£7.50		

VIDC Enhancer



This unique VIDC add-on board for the Archimedes, caters for all types of Multiscan and VGA monitor and mode requirements. There are 2 versions to suit all requirements. The multimode software supplied, provides all the new modes for the selected monitor type, including the now standard Computer Concepts modes. With VGA monitor, you are no longer restricted to a few modes. A Desk Top application supplied on disc, allows new modes to be designed and existing modes to be modified for particular monitors.

Super VGA VIDC Card: Its unique design allows the horizontal and vertical sync to be buffered and have the polarity changed under software control **£45**

MultiVideo VIDC Card: As above but for MultiScan monitors only. **£25**

Panasonic Printers

KX-P1123	£126	KX-P2180C	£156
KX-P1124i	£170	KX-P2123C	£198
KX-P1170	£99	KX-P2180M	£159
KX-P1624	£270	KX-P2123M	£176
KX-P1654	*£332	Colour Kit for P2180M/2123M	£–
KX-P1695	£270		
KX-P2624	*£270		

*** Price includes 12 months On-site warranty**

Cut Sheet Feeders

P36 – 1124/24i	£79	**P37** – 1123/70/80	£69
P38 – P1624/95; P2624			£129

Buffers

P12 4K Buffer Board for KX-P1081	£55
P14 32K Buffer P1123/24/70/80 P1540/92/95; P1624/54/95	£16

Serial Interfaces

P19 for P1123/24/24i/70/80/1624/54/95/2624	£49

Original Panasonic Ribbons

Guaranteed to last 3 million characters

P110 for KX-P1081, 1592 & 1595	£6		
P115 for KX-P1180	£7	**P145** for KX-P1124	£7
P140 for KX-P1540	£8	**P155** for KX-P1624	£8
Colour Ribbons for KX-P1081, 1592 & 1595 Brown, Blue or Red	£9 each		
P150C Colour for P2123/2180	£15		

Citizen Printers

• 120D Plus	£95	• Swift 24E#	£225
• 224	£174	• Swift 24X	£299
• PN-48	£199	• 24X Colour Opt	£32
• Swift 9	£145	• PN48 Ribbon	£4
• AH29804 Manual Cut Sheet Feeder for Swift 9/24/124. Holds 50 Sheets	£29		

\# FREE Colour Option with Swift 24E
\+ FREE 2 years Parts and Labour warranty on all Citizen Printers

• Swift 9 Colour Option		£19
• Swift 24 Colour Option		£29
• Swift 24 Ribbons	Black £4	Colour £13
• Swift 24X Ribbons	Black £8	Colour £16
• Citizen/Archimedes Colour Printer Driver		£15

Integrex Ink Jet Printers

• Colour Jet 132 Printer	£449
• Paper Roll	£6.50
• BBC Screen Dump Software	£10
• Colour Cartridge	£21
• Black Cartridge	£12.40
• 100 A4 OHP transparencies	£55
• 8K Serial Interface Optional	£123
• Colour Jet 2000	£POA
• Betajet Ink Jet Printer	£275



CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 250234 or 233383

Star Printers

LC15	£178	SJ48 Inkjet	£172
LC20	£105	XB24-200 Colour	*£295
LC24-15	£245	XB24-250 Colour	*£355
LC24-20	£158	XB24 Colour kit	£29
LC24-200	£170	ZA200 Colour	*£244
LC24-200 Colour	£205	ZA250	*£310
LC200 Colour	£143		
• Star/Archimedes Colour Printer Driver			£15

* Includes 12 months On-site warranty

Cut Sheet Feeder

LC10/200/24-10	£65	LC15/LC24-15	£125
XB24-10	£80	XB24-15	£139

Serial Interfaces

8K Ser LC-200; LC24-200; FR10; FR15; XB24-10; XB24-15 £52

Buffers

32K Ram Card for LC/XB24-10; 15; LC200 £55

Ribbons

LC10; LC10-II; LC15	Black £4;	Colour £6
LC-200; LC24-200	Black £5;	Colour £12
XB24-10; XB24-15	Black £5;	Colour £12

Laser Printers

All Laser Printers include 12 months On-site maintenance

Brother HL-4	4ppm	£575
Brother HL4-V	4ppm	£640
Brother HL4-PS Postscript	4ppm	£1040
Brother HL8-V	8ppm	£990
Canon LBP4 LITE	4ppm	£495
Canon LBP4+ 1.5M RAM	4ppm	£639
Canon LBP-8III Plus	8ppm	£960
Epson EPL4300	4ppm	£635
Epson EPL4000	6ppm	£485
Epson EPL7500	6ppm	£1145
Epson EPL8100	10ppm	£960
HP Laserjet IIP+	4ppm	£525
HP Laserjet III	8ppm	£1010
HP Laserjet IIID	8ppm	£1495
HP Laserjet IIIP	4ppm	£685
HP Laserjet IIIsi	16ppm	£2515
NEC Silentwriter S62P P/script	6ppm	£1070
NEC Silentwriter 266	8ppm	£670
NEC Silentwriter 290P P/script	8ppm	£1389
Panasonic KX-P4420	8ppm*	£618
Panasonic KX-P4450i*	11ppm*	£915
Panasonic KX-P4451		£1240
Panasonic KX-4455 Postscript	11ppm*	£1450
Panasonic KX-P4430 Satin Print*	5ppm*	£627
Panasonic KX-P4410	5ppm*	£–
Star LP-8 III 2	8ppm	£1249
Star LP-8 III	8ppm	£905
Star LP-8 Star(post)script	8ppm	£1135
Star LP-4	4ppm	£565
Star LP-4 Mk 3	4ppm	£649
Star LP-4PS Postscript	4ppm	£775

* Now with 2 years On-site warranty

Laser Toners

Canon 2, 3 & 4	£46	Star LP4/LP8	£56
Epson GQ	£13	KX-P4420/50	£19
EPL 4100	£59	Laserjet HP IIP & IIIP	£42
EPL7100/7500/8100	£125	Laserjet II/D, III/D	£48
		Qume Crystal (3)	£58

Laser RAM Upgrades

IIP; III/P 1Mb	£51	EPL7100 256K	£39
IIP; III/P 2Mb	£88	GQ5000 512K	£42
IIP; III/P 4Mb	£135	KX4420/50 1M	£75
II & IID 1Mb	£64	KX4420/50 2M	£115
II & IID 2Mb	£99	KX4420/50 4M	£195
II & IID 4Mb	£146	Star LP8 1M	£139
Canon LBP4 1M	£105	Star LP8 2M	£275
Canon LBP8 2M	£125		

Laser Drum & Developer

• Epson Drum	GQ5000 £93	EPL7100	£129
• Panasonic 4420 Drum	£60	Developer	£59
• Panasonic 4450 Drum	£93	Developer	£80
• Qume Drum	£76	Developer	£56

Jetpage Postscript Cartridge

• HP IIP/III	£225	IID & IIID	£227

Various Add-Ons

• Laserjet Appletalk Interface	£135
• HP Adobe Postscript	£399
• Pacific Page Postscript	£259
• HP Premier Font Collection	£28
• Laserjet various Font cartridges	from £45

Hewlett-Packard Printers

# Desk Jet 500	£272	*Paintjet XL 300	£1785
Desk Jet 500 Col.	£399	*Quiet Jet Plus	£382
*Paint Jet Colour	£518	*HP Think Jet	£265
*Paintjet XL	£1196		

3 years extended Parts & Labour warranty £49
* Price includes 12 months on-site warranty

- DeskJet 500 Cart. Black £15; Colour £27
- Paintjet Cartridges Black £19; Colour £23
- Desk Jet 500 256K RAM cartridge £69
- HP Epson FX Emulation Cartridge for Desk Jet £59
- DJ 500 High Capacity Black Cartridge £21
- DJ 500 Colour Archi Printer Driver £15

Plug In Font Cartridges for DJ 500

- 22706B – Prestige, Elite, Line Draw fonts £55
- 22706C Letter Gothic & HP Line Draw fonts £56
- 22707P – Proprint Emulation Cartridge £57
- Desk Jet Unlimited (Book No VAT) £19.75

Canon Bubblejet Printers

	Printer	CSF	D'ble Bin	Ink Cart
BJ10EX	£174	£43	–	£16
BJ20	£254	–	–	–
BJ300*	£284	£88	£65	£12
BJ330*	£380	£110	£79	£12
BJC800C	£1411	–	–	–

* Includes 12 months On-site warranty

- Spare Battery pack for BJ10E £33
- BJ10EX – Archi Turbo Driver £42

Special Offer:
Canon BJ10EX Printer + CC's Turbo Driver £222

NEC Pinwriter Printers

- P20 £178
- P70 £396
- P30 £237
- P90 £605
- P60 £322
- P60/70 Colour Option Kit £59
- Ribbons Black for P20/30 £6 for P60/70/90 £7
- Ribbons for P60/70/90 Black £9 Colour £13.50

Cut Sheet Feeders
P20 £59; P30 £85; P60 £89; P70/90 £80

Epson Printers

DFX5000	£1075	LQ1070	£310
DFX8000	£1940	LQ1170	£432
FX850	£258	LQ2550+	£675
FX1050	£327	LX400	£100
LQ100	£147	LX850+	£138
LQ200	£161	LX1050	£206
LQ570	£201	SQ870	£POA
LQ860 Colour	£440	SQ1170	£565
LQ870	£357	SQ2550	£625
LQ1060 Colour	£585		

Cut Sheet Feeders for

LQ570, LQ870 £47
LX400/850/LQ200/400/450/500/550
LQ1010/1070/1170 £72
LX1050 £115 FX850/LQ860 £128
FX1050/LQ1060/SQ850 £155
LQ2550 £299 SQ2550 £210

Tractor Feed for
LQ800 £44; LQ850/FX850 £69; LQ1050/FX1050 £85; LQ2500 £90; LQ2550 £90.

Accessories

- EX800/1000 Colour Option £45
- EX800/1000 Colour Ribbon £14
- LQ2500 Colour Option £65
- Multifont Card for LQ550/850/1050 £95

Epson Printer Interfaces
RS232 £28 RS232 + 2K Buffer £52

Printer Leads

BBC Centronics 4' long	£5
BBC Centronics 6' extra long	£7
Compact's Special Centronics Lead	£7
Nimbus Centronics Lead	£6
IBM/Archimedes Parallel Lead 6'	£5
IBM/Archimedes Parallel Lead 5 metres	£10
IBM/Archimedes Parallel Lead 10 metres	£15
Double Ended 36 way Centronics Lead 4'	£7
Double Ended 36 way Centronics Lead 6'	£9
RS232 Leads (Various)	P.O.A.

Laser Direct

- Special High Res Card 600 DPI for Canon LPB 4 & LPB 8 Laser Printers £315
- LPB 4 Printer plus High Res Card £875
- LPB 8III Printer plus High Res Card £1275
- LPB 4 Optional Paper Tray £79

Fujitsu Printers

B-100	£205	DL1100 Col	£267
B-200	£270	DL1200	£363
DL-900	£181	DL3600	£508
DL1100	£217	VM800	£1036

Ribbons

DL900/1100/1200	Mono	£5	Col.	£11
DL3600	Mono	£6	Col.	£12
B-100/200 Ink Cartridge				£15

Concept Keyboards

Standard A3 Keyboard with BBC Software	£138
Standard A4 Keyboard with BBC Software	£109
Archi A3 Keyboard	£139
Archi A4 Keyboard	£110

Listing Paper (Perforated)

- 1,000 Sheets 9.5" x 11" Fanfold Paper £7
- 2,000 Sheets 9.5" x 11" Fanfold Paper £11
- 1,000 Sheets 9.5" x 11" NCR 2 Part Fanfold £21
- 1,000 Sheets 15" x 11" Fanfold Paper £9
- 2,000 Sheets 15" x 11" Fanfold Paper £16
- 1,000 Sheets true A4 Fanfold Paper 70gms £11
- 2,000 Sheets true A4 Fanfold Paper 70gms £21
- Teleprinter Roll (Econo paper) £4

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Carriage 1K Sheets £2.50, 2K Sheets £3.00

Printer Labels

(On continuous fanfold backing sheet)

1,000 off, 90 x 36mm (Single Row)	£6.00
1,000 off, 90 x 36mm (Twin Row)	£6.25
1,000 off, 90 x 49mm (Twin Row)	£7.50
1,000 off, 102 x 36mm (Twin Row)	£6.75

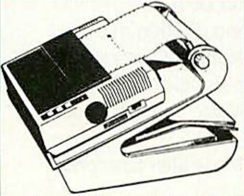
Laser Printer Labels on A4 Sheets

3750 off, 70 x 29mm (3 Rows)	£15.50
2400 off, 70 x 37mm (3 Rows)	£15.25
2625 off, 70 x 42mm (3 Rows)	£15.00

Printer Ribbons & Various Dust Covers

Type	Ribbons	Dust Covers
BBC Micro	–	£3.50
BBC Master	–	£4.00
Archimedes Micro pair	–	£9.00
Citizen 120D	£2.75	£4.50
DMP2000	£2.75	£4.75
DMP4000	£3.75	£4.85
EX800/1000	£3.50	£5.00
RX/FX80/85/800/MX80	£2.95	–
FX/MX/RX100/1000	£3.95	–
Kaga/Taxan KP810/815	£3.25	£5.00
LQ400/500/550/800/850	£3.25	£6.00
LQ1050/LQ2500	£4.00	–
LX80/86	£2.75	£4.50
LX400/800/850	£3.50	£5.00
M1009/GLP	£2.95	£3.75
NEC P2200	£4.50	£5.00
Panasonic KX1080/81	£6.00	£5.00
Panasonic KX-P1124	£7.00	£5.00
Star LC24-10	£2.95	£6.00

Professional Printer Stand



The professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Its ergonomic design ensures smooth paper flow and automatic refolding.

80 Column version £24 (carr. £3)
132 Column version £29(carr. £4)

Universal Printer Sharers/Changer

Connect up to 5 Micros to 1 printer or 5 printers to 1 Micro with our combined, Sharer/Changer switch boxes.

Standard Low Cost Type

Connects	Serial	Parallel
• 2 to 1	£10	£11
• 3 to 1	£13	£14
• 4 to 1	£16	£17

Professional Type

Connects	Serial	Parallel
• 2 to 1	£17	£18
• 3 to 1	£22	£25
• 5 to 1	£34	£38

Cables extra at £6 each

2 Way Compact Switch

A handy 2 way printer switch can be attached to the micro or monitor for ease of use.
• Centronics £18; • Serial £17
(Cables extra at £6 each)

Auto Printer Sharer Switch

Cross Over Manual Switch	
2 In/2 Out Parallel	£29
2 In/2 Out Serial	£28
3 In/2 Out Serial	£36

256k Multi Spooler

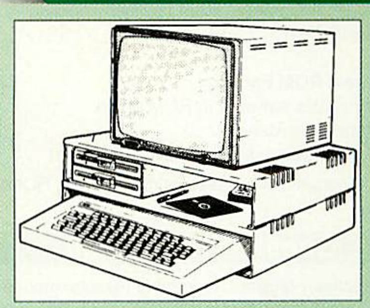
These Auto Parallel Printer Sharers have built-in 256K of Printer Buffers. They can be used as Auto Sharers, Printer Buffers or both.

- 2 In/2 out £135
- 4 In/2 out £169
- 8 In/1 out £199

Compact Converter Units

Serial to Parallel £36 Parallel to Serial £37

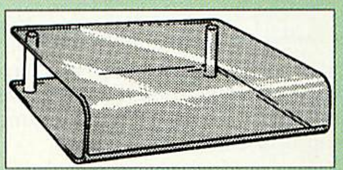
Plinths for the BBC B, BBC Master & A3000



Protect your computer from the heat of your VDU. Our micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and VDU, whilst the double height version provides enough room for our stacked disc drive and other peripherals like, Eprom programmer, music unit or simply discs & stationery. The computer slides neatly in the lower section allowing easy access to remove the lid. Colour: Matching BBC Beige.

- Single BBC Plinth 420 x 310 x 105mm £13
- Double BBC Plinth 420 x 310 x 210mm £24
- Single Master Plinth 490 x 310 x 105mm £14
- Double Master Plinth 490 x 310 x 210mm £26
- A3000 Single Plinth (very sturdy & precision made), has a slot on the left for the switch & cut out on the right for 3.5" Disc Drive £15

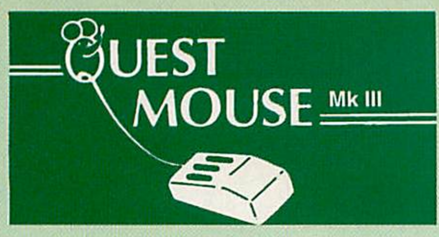
Perspex Printer Stand



Give your Computer System a touch of Class with our elegant, smoke finished Perspex Printer stand.

80 Column version £16 (carr £3)
136 Column version £20 (carr £4)

Continued→ → → → → → → → →



- Quest Mouse III & Quest Paint £59
- Quest Mouse III, Quest Paint, AMX Stop Press & Pagefont £89
- Quest Mouse III only £30
- Quest Paint Software only £34
- Quest Font Disc (22 Text Fonts) £15
- Quest Mouse Mat (Red or Blue or Green please specify) £3
- Quest Colour Dump Disc – This new software allows you to print direct from Quest Paint to your Integrex Colour Printer £18

(P.S. Quest Paint is not compatible with BBC Compact)

Quest Paint is the winner of the BBC Acorn User 1990 Award for the Best Art/Graphics software

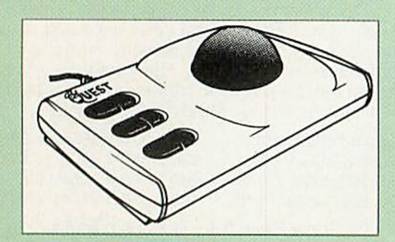


Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.

ConQuest ROM Package £30
(Price includes software in ROM and a comprehensive Manual).
(Not Compatible with BBC Compact)
(P.S. Conquest is a Quest Paint extension ROM).

Quest – Tracer ball

An attractively finished, extremely reliable, mouse replacement, input device. Requires very little desk space. Connects directly to your BBC B, BBC Master or Archimedes Micro.



QT-10 BBC/Master Version **£25**
QT-20 Archimedes Version **£26**

Mouse Cleaning Kit

To obtain trouble free operation and prolong the life of your mouse, the high tech rodent requires regular cleaning. Our deluxe mouse cleaning kit is ideal for the purpose £3



CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 250234 or 233383

Archi Mouse Port Splitter

Our handy little splitter unit eliminates the risk of damaging your micro due to constant plugging and unplugging of the mouse by allowing you to connect both, a joystick and a mouse simultaneously to your Archimedes. £15

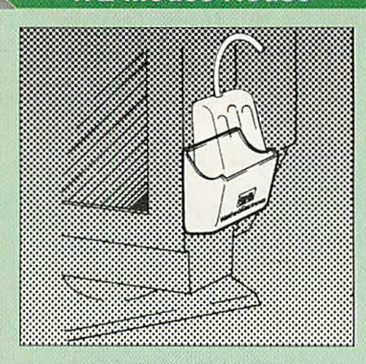
Mk III AMX MOUSE

- **AMX Mouse plus Super Art £54**

(Please specify for BBC, Master or Compact)

- AMX MOUSE ONLY £29
- AMX SUPERART Package £29
- AMX STOP PRESS – A Desktop publishing software. Works with Keyboard, Joystick or a mouse £25
- PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker £13
- AMX DESIGN (ROM) £29
- AMX EXTRA EXTRA £16
- MOUSE MAT £3

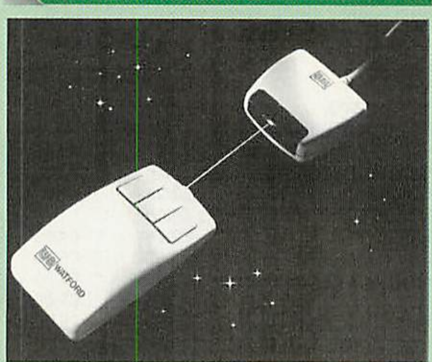
WE Mouse House



Treat your mouse to a cosy Mouse House. This handy little gadget solves the problem of where to store your mouse when it is having a rest. Made of sturdy plastic, the WE Mouse House attaches to the side of your computer, monitor, disc drive etc.

Only £3

Archi Cordless Mouse



Features
- Infra Red Signal Transmission
- High Resolution 200 DPI
- High Tracking Speed of 600mm/s up
- Anti-static Silicon Rubber Coated Ball
- Low Friction Teflon Footpads
- Power - by two AAA size batteries (not included)
- Automatic Standby Mode after 5 seconds inactive
- Auto Power Shut-Down after 20 seconds inactive

Price £39

BEEB VIDEO DIGITISER



"Test Bureau Approved for Use in Education"

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro. This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket. The software supplied includes a sophisticated, fast screen dump routine.
Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem. The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

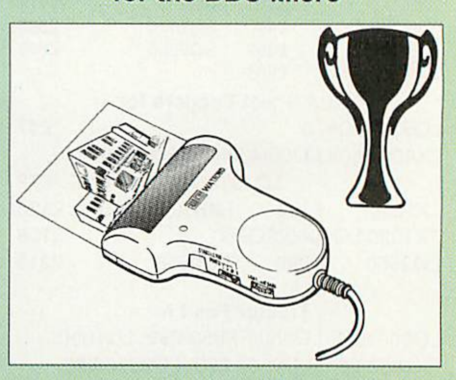
£99

(BBC B+ and Master compatible, except Master with Econet)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)

Beeb Hand Scanner

Hand-held Scanner for the BBC Micro

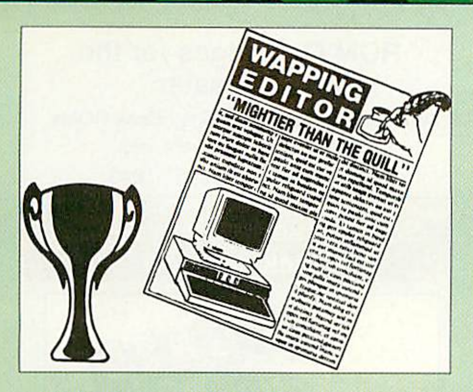


Watford Beeb HandScan is a compact unit which will allow photographs, diagrams, or any other documents to be digitised quickly and easily, to then be used in a desk top publishing package, art program, or even in your own Basic programs!

The HandScan plugs directly into the 1MHz bus on the BBC while a comprehensive set of utilities provided by the sophisticated ROM firmware. The scanner has a resolution of either 100 DPI or 200 DPI when accuracy is essential. Pictures as wide as 4" may be scanned in mode 0 and various types of dithering may be selected to simulate the grey levels of a scanned picture.

All necessary software has been included in the firmware to allow the scanner to read images directly into our Wapping Editor with little more than the click of the mouse. The digitised picture may then be incorporated into your magazine, newsletter, report or any other document.

Beeb HandScan & Firmware £99



Winner of the BBC Acorn User 1990 Award for the Best DTP/Word Processor

The Wapping Editor

The Wapping Editor from Watford Electronics represents a breakthrough in Desktop Publishing for the Beeb. The package includes a 64K ROM containing ALL the software needed to get into print fast; a very sophisticated graphics module, professional quality typesetting software, a word processor, a comprehensive font editor for designing your own typefaces, and a variety of printer dumps. This mouse-driven system is designed for the BBC B, the B+ and Master computers and will take full advantage of any Sideways and Shadow RAM that may be fitted. It will run under DFS, ADFS and Network filing systems and requires as a minimum just a single 40 track drive.

Included with the system is a utility disc containing several high quality fonts, various utilities and a ROM image of a Support ROM. A comprehensive 100 page manual completes the package. The Support ROM contains routines to allow an area to be rotated to any angle or distorted to any four-sided shape. Also included are facilities to draw ellipses at any angle and sectors, segments and arcs (in Master or BBC B with Acorn GXR). Another of the features of the Support ROM is a 'Turbo DFS' which gives DFS access times comparable with those of ADFS.

Page Layout Section

The Wapping Editor may be used to create pages of any size from an A6 to a full A3 page. If none of the eight default page types suit your purpose, the stand-alone page creation program may be used to create pages to your own requirements. By using proportionally spaced fonts and genuine microspacing it is possible to print over 150 characters across an A4 page. A unique feature of the Wapping Editor is the 'A5 x 2' page size allowing two A5 pages to be printed side by side onto a single A4 sheet.

The graphics module incorporates the facilities like: pencil, brush, airbrush, polygon, circle, eclipse, fill, cut & paste, etc.

Text may be typeset, either justified or unjustified, in any font anywhere on the page. Simply select which font and text document you wish to use, and pull out a rectangle on the page where you want the text to be – it's as simple as that! Multiple columns may be printed just as easily and a special 'expand' feature may be used to expand the microspacing so that the document exactly fits the space defined.

Word-Processor

The integral word processor is the ideal tool for producing your text documents, although text can of course be read in from any of the other popular word processors such as View, Wordwise etc.

The Font Editor

The font editor module will allow you to design your own typefaces or to modify the ones provided on the utility disc. This sophisticated editor has numerous functions designed to take the tedium and frustration out of producing good looking, well balanced fonts. Each character may be individully proportionally spaced and characters of any size up to 16 x 16 pixels may be defined.
Pictures may also be 'grabbed' from a video source by using the Watford BEEB Video Digitiser.

Wapping Editor Software Pack	**£59**
Wapping Editor plus Mouse	**£79**

(Wapping Editor only works with Master Compact if a Mertec Expansion box is fitted)

Wapping Art Disc

Over 250K of clip art to cut and paste into your Wapping Editor pages. Pictures include maps, transport, people, media, sport, games etc.
Two 'ratio' screens for use with hi-res and rotated A5 pages to ensure images are not distorted when printed out.

Music writing symbols in the form of pattern and brush for quick production of manuscripts are included together with staves.

There are two prepared hi-res pages laid out for printing labels, both single and double width. Ready made label designs are included but these can be easily replaced with your own designs.

A Mode 0 screen dump routine is also included. To pack such a large amount of data onto the discs the screens have been compressed and routines to compress and expand Mode 0 screens are included on both discs. Using the packing routine you can archive large numbers of screens onto a single disc.

£15

Wapping Font Disc 1

Sixteen additional fonts, including smaller version of Oberon and Daisy and two new sizes of the standard font for the Wapping editor.
Also included are three Mode 0 screens containing giant 'headline' fonts to cut and paste to create extra smooth headlines.
Supplied complete with instructions.

£12

Wapping Font Disc 2

This new addition to our Wapping range of DTP software provides you with additional 23 fonts for the Wapping Editor DTP pack. (80 track discs only).

£13

Archi A4 Scanner

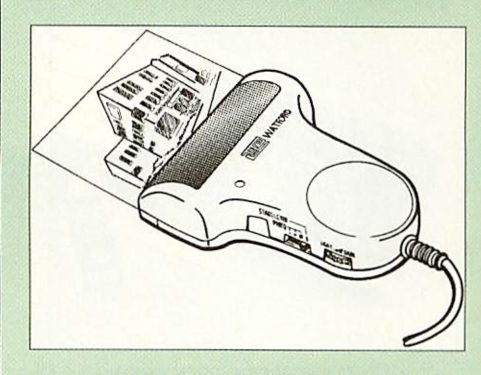


This most advanced Archi A4 image scanner is supplied complete with ROM based podule software. Features provided include facilities for zooming in on an image and inverting the image in X and Y directions, saving and printing of the sprite created. Interactive help is supplied using the !HELP application on the Acorn applications discs.
The 216mm scanning width can cope with both desktop scanning of single sheets, photographs, diagrams, etc., with its fast ten page automatic document feeder, but it can also detach from the feeder to become a convenient hand-held full page scanner for larger documents or pictures.
Scanned image control can be freely adjusted in increments of 10 dots per inch from 100 up to 400 dpi resolution with 64 levels of grey scaling. A built in shading controller and manual brightness control achieve optimum image clarity.
Unlike some scanners, which use a red light source, the Watford scanner uses a yellow/green source which vastly improves the light/dark contrast, thus eliminating the effect where any red-based colours are faded down to white and so do not show up in the scanned image.
All these features and facilities combine to make the Archi Page Scanner the fast and convenient way in which to add that extra impact, interest and clarity to documents, reports, instruction sheets, manuals, news letters, etc., from your Archimedes DTP package.

New Low Prices:

Archi A4 Scanner	£269
Sheet Feeder for above	£75
Scanner + Sheet Feeder	£359

Archi Mk II Hand Scanner



Watford Electronics is now able to offer a complete hand held scanning package, possibly the most essential addition to any desk top publishing system, for only £119. The package includes the most comprehensive utility software available for the Archimedes, a high quality hand held scanner, and all necessary documentation to get you going straight away.

SCANNER

The scanner is capable of scanning up to an amazing 400 dots per inch (DPI)! The scanning area is 4" wide, and the height is only limited by the maximum amount of memory available. The dot resolution may be switched to 100, 200, 300 or the maximum 400 dpi. One of four operating modes may be selected offering either pure monochrome scanning, or one of three grey level modes. The grey level modes use different size dither patterns to represent up to 16 shades of grey. There is also a dial to allow the "brightness" to be adjusted over a wide range, in order to optimise the quality for any specific image. The scanner interface is a standard, single width, expansion card (podule) which plugs into the Archimedes' backplane. The socket on the rear panel connects the scanner by 1.8 metres of cable.

SCANNER SOFTWARE

Full use is made of the windowing and the multi-tasking facilities of RiscOS. The software is supplied in a 64Kbyte ROM located on the interface board. The scanner appears as a small icon on the desktop icon bar, and the software is retrieved from the ROM simply by clicking on that icon. As you scan a page, the image appears in the scanning window on the screen, scrolling up in real time. The other facilities included in the software are.

Cropping and scaling to any size including stretching and squashing in X and Y direction separately.

Colour tinting.
X and Y flip.

Edge detection which turns solid objects into outlines.

Selective directional copying which allows features (i.e. lines or text) to be made thicker or thinner.

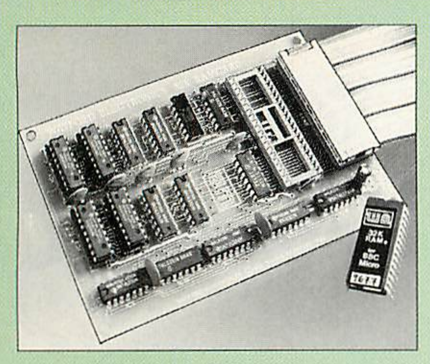
Scanned images may be saved as sprite files or transferred directly into other RiscOS applications (DTP, Draw, Paint) simply by dragging the sprite file into the application's window. Sprites may also be generated using anti-aliasing. This greatly improves picture quality and is particularly effective when scanning material with a range of grey tones, such as photographs. Images can be printed on any printer that is supported by a RiscOS printer driver, with optional settings for portrait or landscape modes, image scale and positioning. Images are printed using the full resolution of the printer and are not limited to the screen resolution.

On-screen help is provided via the RiscOS interactive help facility. Calls are also provided in the ROM for users wishing to write their own software, incorporating the use of the scanner.

AHS-4 Archi 300/400 Version	**£119**
AHS-3 Archi A3000 Version	**£129**

Continued→ → → → → → → → → →

32K Shadow RAM/Printer Buffer Card Expansion Board



A MUST FOR WORD PROCESSING

Simply plug the ribbon cable plug into the 6502 socket and gain a massive 32K of extra RAM.

- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28K bytes free – 5 times as much as normal.
- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24k of text in memory. This product is recommended as an ideal complement by Computer Concepts.
- Use the full 32k or the bottom 12K of the expansion RAM as a printer Buffer. (P.S. Only 12K printer buffer can be used with Wordwise & WW+, due to the way they are written).
- Unique facility to turn ROMs off and on again.

Only £54

- **ARIES B-32 Shadow RAM Card £55**

Commander Joystick



Features:

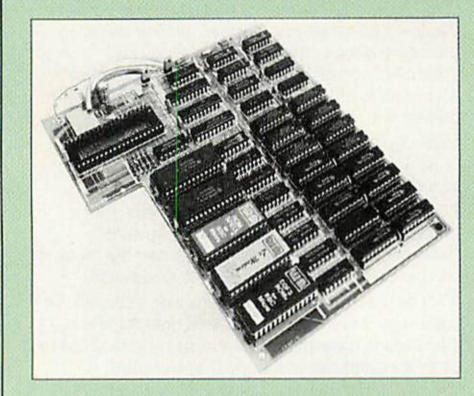
- Direct connection to BBC Analogue input port – no interface needed.
- Fully compatible with all BBC Joystick controlled games programmes.
- Switchable springs allow selection of floating or centring operation.
- Trim adjusters for both X and Y axes for fine centre adjustment.
- Convenient stick mounted fire button with additional base buttons.

Price: £15

Voltmace Joysticks

Delta 3B Single Joystick	£10
Delta 3B Twin Joysticks	£15
Delta 3C Joystick for Compact	£10
Delta 14B Single Joystick	£11
Delta 14B/1 Adaptor Module	£12
Transfer Software Disc-Tape	£7
Delta-Cat A mouse eliminator Joystick for the Archimedes	£24
Analogue aircraft style yoke Joystick to run in the analogue port of the BBC B & Master 128	£25

ROM/RAM Card



- NO SOLDERING required to fit the board.
- Fully buffered for peace of mind.
- Compatible with BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM.
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- FREE utilities disc packed with software.
- Large printer buffer.
- UNIQUE fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROMSPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

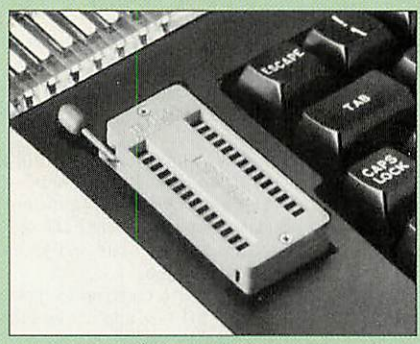
PRICES:

• ROM/RAM card with 32k DRAM	£42
• ROM/RAM card with 64k DRAM	£54
• ROM/RAM card with 128k DRAM	£89

OPTIONAL EXTRAS:

• 16k plug-in Static RAM kit	£8
• 16k DRAM for Upgrade	£13
• Battery backup	£3
• Read and Write protect switches	£2 each
Complete ROM-RAM card with all options fitted	£109

Sideways ROM ZIF Socket System



Allows you to change your ROMs quickly and efficiently, without having to open the lid. The ZIF socket is located into the ROM Cartridge's position. It is very simple to install. No soldering required. Also included in the price is a plastic see through storage case with antistatic lining, which allows you to store 12 ROMs.

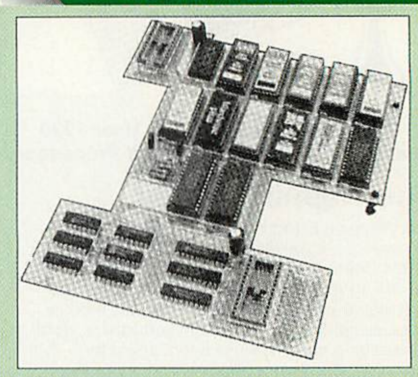
£18

ROM Cartridges for the BBC Master

Will accept the larger Piggy Back ROMs like Interword, Quest, etc.

• Twin **£8;** • Quad **£13**

Solderless Sideways ROM Socket Board



- Increases your BBC Micro's ROM capacity from 4 to 16.
- **No soldering required.**
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish" allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £35

Battery Backup fitted **£39**

Battery Backup only **£3**

16K Sideways RAM **£8**

- Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

Only: £8

Connecting Leads

(All ready made and tested)

CASSETTE LEADS 7 pin DIN Plug	
to 3 pin DIN Plug + 1 Jack Plug	£2.50
to 7 pin DIN Plug	£3.00
to 3 Jack Plugs	£2.50
6 pin DIN to 6 pin DIN Plug (RGB)	£3.00

Disc Drive Power Leads

Supply from BBC power supply to standard Disc Drive Connection: Single **£3.00;** Dual **£3.75**

Disc Drive Interface Leads

BBC to Disc Drives Ribbon Cable
Single **£4** Twin **£6**

Miscellaneous Connectors

	Plugs	Sockets
RGB (6 PIN DIN)	50p	75p
RS423 (5 pin Domino)	70p	80p
Cassette (7 pin DIN)	40p	95p
ECONET (5 pin DIN)	35p	50p
Paddles (15 pin 'D')	150p	250p
Disc Drive Plug 4 way	100p	–
6 way Power Connector	120p	150p

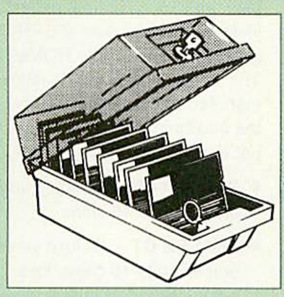
Watford DATA DUCK

Convert two single Disc Drives into one Dual Drive with this simple external unit (Suitable for Disc Drives with PSU. For Disc Drives without PSU, you will also require Watford Power Duck, see below).

£14

Watford POWER DUCK £8

Antistatic Lockable Disc Storage Units



- **M35** – holds up to 50 5.25" discs **£4.95**
- **M85** – holds up to 95 5.25" discs **£6.95**
- **M25*** – holds up to 25 3.5" discs **£4.95**
- **M50** – holds 50 3.5" discs **£6.50**
- **M100** – holds 100 3.5" discs **£6.99**
- **M10** – holds 8 of No. 10 Data Cartridges **£15**

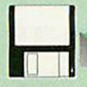
* Not lockable

Disc Plonker Rack



When using ones micro, there is a tendency to have more than one Disc on the desk. This exposes them to the hazards of fingerprints, scratches, dust, coffee and an untidy desk. Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. Holds up to eight 5.25" discs.

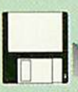
Protection at Only: **£2**



3M – Diskettes

Lifetime warranty on 3M Discs

- *10 x 5.25" S/S D/D 40T (744)* ***£5***
- *10 x 5.25" D/S D/D 40T (745)* ***£5***
- *10 x 5.25" S/S D/D 80 Track (746)* ***£7***
- *10 x 5.25" D/S D/D 80 Track (747)* ***£7***
- *10 x 5.25" 1.6M D/S D/D High Density for IBM XT and AT* ***£9***
- *10 x 3.5" S/S D/D 40/80 Track* ***£7***
- *10 x 3.5" D/S D/D 40/80 Track* ***£7***
- *10 x 3.5" Double Sided High Density* ***£13***



Top Quality Diskettes

Watford's life time guaranteed disc are supplied complete with self stick labels & plastic library case.

- *10 x **M3** 3.5" D/S D/D 80 Track* ***£7***
- *10 x **M9** 3.5" D/S High Density* ***£12***
- *10 x **M4** 5.25" S/S D/D 40 Track* ***£5***
- *10 x **M5** 5.25" D/S D/D 40 Track* ***£5***
- *10 x **M7** 5.25" D/S D/D 80 Track* ***£7***
- *10 x **M8** 5.25" D/S H/D Hi-Density* ***£9***
- ***M2** 3" Double Sided* ***£2.50** each*

Special Bulk Offer Discs

Supplied packed in Anti-Static lockable Disc Storage Unit in lots of 100. (Lifetime warranty on Discs)

BULK PACK DISCS in lots of 100

Type	S/S 40T	D/S 40T	D/S 80T
• Without Sleeves 5.25"	£28	£33	£38
• With Sleeves 5.25"	£31	£36	£41
• 3.5" D/S D/D	£27 for 50		£49 for 100

3.5" Disc Drive

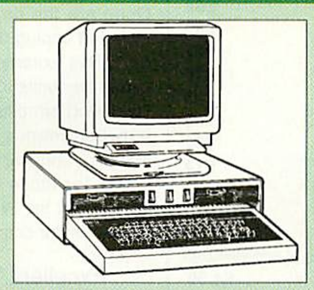


These top quality 3.5" Double sided, 80 track, are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc.

Type	Description	
	Disc Drive without PSU	
• **CLS35:**	Single Disc Drive, 400K	**£59**
• **CLD35:**	Twin Disc Drives, 800K	**£109**
	Disc Drive with PSU	
• **CS35:**	Single Disc Drive, 400K	**£82**
• **CD35:**	Twin Disc Drives, 800K	**£126**

(P.S. CS35 is supplied in a twin case with a blanking plate to enable easy expansion to a dual drive at a later stage)

Disc Drives in Monitor Stand



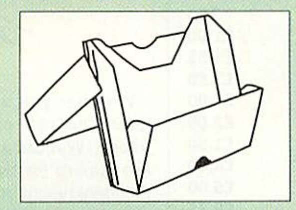
• **CDPM 800S** – Twin 5.25", 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC B & Master 128K micros. Supplied complete with integral power supply, cables and Utilities disc. The mains switch with neon On/Off light indicator, and the two 40/80 track switches are mounted on the front panel for ease of use.

£165

• **DP35 800** – Same as above except, one disc drive is a 5.25" and the other is 3.5".

£154

Plastic Library Cases



- **DLC1** – Holds 5 x 3.5" Discs. **£1.50**
- **DLC2** – Holds 10 x 3.5" Discs. **£1.90**
- **DLC3** – Holds 5 x 5.25" Discs. **£1.60**
- **DLC4** – Holds 10 x 5.25" Discs. **£2.00**

Disc Albums

Attractively finished in leather-look PVC Vinyl

- **DW1** – Holds 6 x 3.5" Discs **£2.50**
- **DW2** – Holds 6 x 5.25" Discs **£3.00**
- **DW3** – Holds 20 x 5.25" Discs **£3.50**
- **DW4** – Holds 40 x 3.5" Discs or 5.25" Discs **£4.50**

Floppy Head Cleaner Kit

The heads in floppy drives are precision made and very sensitive to dirt. The use of Cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. it is very simple to use. Available in 3.5" & 5.25", please specify.

Price £4

Acorn & Watford DFSs

- Watford sophisticated DFS ROM **£16.00**
- Watford DFS Kit complete **£49.00**
- DFS Manual (comprehensive) **£6.95**
- Acorn DNFS ROM **£17.00**
- Acorn ADFS ROM only **£25.00**
- Acorn 1772 DFS ROM Kit **£49.00**
- Acorn DFS Kit complete **£48**

Watford's MkII 1772

Single/Double Density DFS

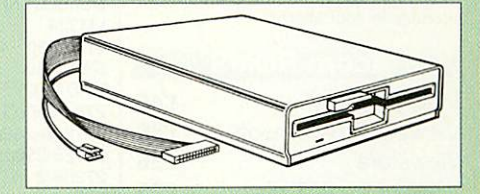
Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our Mk II DDFS Board with its 1772 Disc Controller, has been adapted to allow the use of Acorn ADFS as well. It also has all the commands of the Acorn's 1772 DFS, plus many more added features.

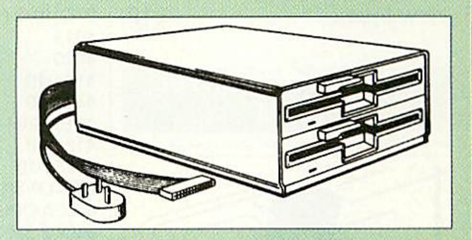
- Complete Kit Special Price **£44**
- DDFS Manual (No VAT) **£6.95**
- We will exchange your existing DFS Kit for our sophisticated DDFS for only **£26**

Quality Disc Drives from Watford

All our Disc Drives are Double Sided and will operate in both Single and Double Density modes. All 5.25" Disc Drives are 40/80 track switchable. For ease of use, the switches are front mounted. Follow the trend with a Watford plinth. (Turn to the 6th page of our advert for the Plinths).
P.S. All our 5.25" Disc Drives with PSU are compatible with the Compact Micro. All you require is our special Compact Disc Drive cables designed by us.

"Test Bureau Approved for Use in Education"





Our Disc Drives conform to BS415

Type	Description	
	Disc Drive without PSU	
• **CLS400S:**	Single, 40/80 track 400K Double sided Drive	**£70**
• **CLD800S:**	Twin, 40/80 track, 800K Double sided Drives	**£138**
	Disc Drive with PSU	
• **CS400S:**	Single, 40/80 track, 400K Double sided Drive	**£80**
• **CD800S:**	Twin, 40/80 track, 800K Double sided Drives	**£149**

Special Cable to connect both 3.5" and 5.25" Disc Drives simultaneously to the BBC Compact £13

Continued→ → → → → → → → →

Computer Concept's ROMS

Disc Doctor	£18
Inter BASE	£49
Inter CHART	£25
Inter SHEET	£37
Inter WORD	£36
Mega-3 ROM	£76
Spell Master	£42

Wordwise plus

£40

We are giving away absolutely **FREE,** the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

This advance utilities ROM extends the power of your Wordwise plus ROM.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear test-segment area.
- BBC B, B+ and Master compatible.

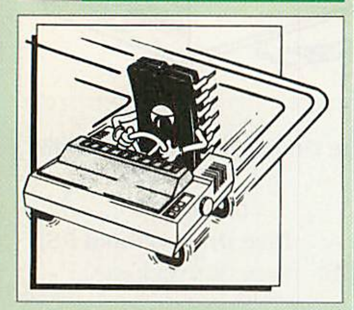
Only **£24**

(N.B. Word Aid requires a Disc interface in your Micro)

Acorn ROMS

View 3.0 ROM	£45
Viewsheet (Acornsoft)	£36
Viewstore	£36
Viewspell – 80T disc	£25
View-Index	£12

View Printer Driver ROM



View is a powerful word processor, but it seriously lacks in terms of printer driver support. With the View Printer Driver ROM, the View users will find themselves in the realms of advanced word processing.

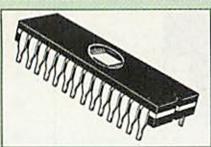
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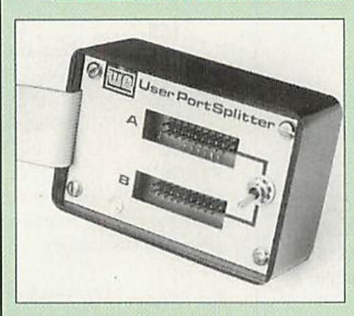
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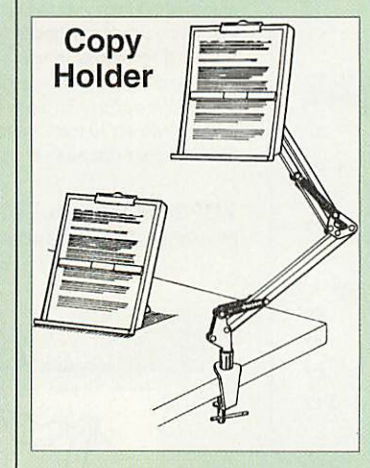
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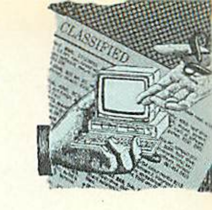
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● Unopened pack of five Kores printer ribbons for Qume IV, Sprint 7/9, sample Daisystep. Contact R Newmark, Sunderland. Tel: 091-536 2066

● A3000, 4Mb and 40Mb SCSI, PC Emulator, colour digitiser, 5.25in, C development, Archway, 100+Mb s/w (call for list) – £1500. Contact Dave, London. Tel: 071-387 7050 x3511 day

●All Archimedes users are invited to join our Archimedes Users club. Write to J Michalski, 6 Furzeland House, Sheephouse Way, New Malden, Surrey KT3 5PH, for more details.

● BBC Acorn User mags, 1st issue Jul/Aug 1982 to Aug 1987 Micro User, Vol 1 Mar 1983 to Aug 1987 minus two – offers. Contact Mr W Barrett, Surrey. Tel: (0883) 743783

●A3000, 2Mb Ram, Acorn colour monitor, software, magazines, manuals, boxed, immaculate condition – £650. Contact Mr D Farrah, Surrey. Tel: 081-647 1653

● BBC B, tape player, joysticks, manuals – £150 ono. Contact Miss S Steggall, Wiltshire. Tel: (0672) 515487

● Master 512K with 40/80 double drives, orange screen monitor and Acorn teletext adapter, includes Gem, GemPaint, Gemwrite, Beebug, Masterom, Spellcheck III – £550 ono. Contact I Gilmore, Herts. Tel: (0438) 814059

● Communitel software pack, unused, GEC Datachat modem, Acorn Electron – any offers for lot or seperate. Contact W Good, East Sussex. Tel: (0273) 481190

● Panasonic KPX 1124 mint – £145, software boxed, Lemmings, Chocks, Exra, E-Type, Mig 29, Chess 3D, Atelier, Proart, Tracer, Arcol, minimum half price. Contact Chris, Maidenhead. Tel: (0628) 777363

● BBC M512, Akehter 40/80 DSDD 5.25in, Z80 second processor, Microline printer, Gem mouse, Rom cartridge, loads of mags, manuals and discs – £425. Contact Mr M Smith, Lincs. Tel: (0427) 615074

● BBC B Issue 7 with Interword and Pendown – £180, Watford 40/80 drives – £110, Philips 80 monitor – £45, Brother printer – £45. Contact Mr M Basford, Tunbridge Wells. Tel: (0892) 546493

● A3000, colour, 2Mb, 105Mb SCSI, 5.25in drive, software including Acorn DTP, 1st Word+, Schema, Genisis, Graphbox, PC Emulator, Lotus 1-2-3, games, all manuals – £949. Contact Mr Jones, Clwyd. Tel: (0492) 516285

● Multipod – £80, VidiRGB – £46, 2Wb plane – £15, Elite – £20, Saloon cars – £16, Tween – £15, Font FX – £8, DrawBender – £8, Inertia, Ballarena, Slideshow – £9. Contact Elliot, Essex. Tel: 081-508 7648 eve

● BBC B with disc drive, Rom board Interword, Spellmaster, Addcomm, Stop Press DTP – £100. Contact Mr R Paddle, Kent. Tel: 081-460 2116

● Games: GBA, Catallysm, Break 147, Nevryon, Chocks Away extra missions, Enter the Realm, Pacmania, Lemmings – from £5 to £10. Contact Mr A Reeves, Derbyshire. Tel: (0283) 552761

● Wanted: Archimedes A3000 computer, will consider A310/A410 series, cash waiting. Contact A Allen, Derby. Tel: (0332) 281540

● Master 128, 3.5in disc drive, Panasonic Kxp-1081 printer, paper, Logo and Wordwise Roms, manuals, magazines, software – £375 ono. Contact Mr J Hay, Edinburgh. Tel (031) 662 4760

●Help! Beginner! Archimedes contacts wanted to exchange ideas and PD, 100% reply. Contact Andi Wall, 98 Headstone Lane, North Harrow, Middlesex HA2 6JN

● BBC B, twin disc drive, M128 upgrade, Roms include Interword, View sheet, Dumpmaster 3, ADFS, 8271 chip, joystick, books, mags and cooling fan – £300. Contact Mr G Hough, Northwich. Tel: (0606) 76535

● Wanted for Archimedes A310: Hard drive with controller (80Mb to 120Mb) and 4Mb Ram. Cash waiting. Contact Mr H Thind, Slough. Tel: (0753) 820526

● SCSI tape streamer 60Mb, sealed box, backup software, cables and tape – £300 ono. Contact Mr R Stedman, Cambridge. Tel: (0223) 213746

● A300, 4Mb Ram, serial upgrade, Philips colour monitor, Scanlight Junior scanner, Vidc enhancer, dust cover, manuals, software, monitor stand – £800. Contact Mr B Howat, Merseyside. Tel: (0704) 63344

● Bargain: Archimedes 310, Acorn colour monitor, – £450 ono. Contact Mr I Bell, Glasgow. Tel: 041-883 3351

● A3000, upgraded (2Meg), colour monitor, 2nd floppy drive, serial port, stand, manuals, usual software, extra fonts/artwork etc, Acorn DTP, excellent condition – £725. Contact Mrs L Dobson, Dyfed. Tel: (0269) 861256

● Archimedes software: Genesis – £35, PC Emulator – £40, Wonderland – £20, Herewith the Clues – £12, Dabhand basic V guide – £6, Pres monitor Plinth – £13. Contact Mr N Metcalfe, Surrey. Tel: (0372) 274162

● A310 and PC Emulator (VI.7), Acorn DTP, games, disc drive, software – £400, Philips CM8833 Monitor – £100, Brainsoft video digitiser – £70, 20Mb hard disc and Podule – £110. Contact Rob, Cheshire. Tel: (0270) 875069

● BBC B – £300, Master Turbo – £450, too much equipment to list here, also Archimedes Genitiser – £100. Contact B Adlington, Rotherhithe. Tel: 071- 231 6730

● 2 Mb colour A3000, manuals, discs, PC Emulator, software and games, to good home – £650. Contact Ewen, Leicestershire. Tel: (0533) 864910.

● Archimedes A3000, Acorn colour monitor, 2 Meg Ram, Lemmings, Zarch, 1st word, PC Emulator etc, bargain – £650. Contact A Sawson, Derby, Tel (0332) 664962

● Wanted: BBC Master 128 plus monitor, disc drive and printer if you have one. Contact Phil, St Aubens. Tel: (0727) 861961

● Master 128 Mos V3.5, Eproms Masterrom, ADI Comustar, Dumpmaster, Help, Viewstore, Zoom and Smart Cart, complete set of manuals – £300. Contact Mr P Derwent, Twickenham. Tel: 081-892 9278

● Attention teachers! Three quality educational programs, ArcArt – simple art program, Infant maths – counting game, Snap – computer version. All for only £2. Contact Nicholas Marriott, 160A Drum Road, Cookstown BT80 9DW

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The first full colour printer drivers available for the Archimedes. The colour TurboDrivers in conjunction with the BJC800 inkjet printer are ideal for colour proofing work or for anyone wanting a small number of high quality colour prints.

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- A4 and A3 paper sizes
- Plain paper capability although for best results Canon inkjet paper is highly recommended. Printer supplied with 20 sheets of A4 sample inkjet paper.
- Four colour, cyan, magenta, yellow and black ink for full spectrum colour and high quality blacks.
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- The fist true 24-bit colour RISC OS printer drivers. (All existing printer drivers based on Acorn code are only 8-bit or 256 colours maximum.) The colour TurboDrivers can produce millions of colour shades on the BJC800 from programs such as Impression, !Draw and Artworks. Acorn sprites are currently limited to 256 colours.
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WORD POWER

There are many ways to distort text decoratively on the Archimedes and now another contender is in the running. Paul James examines the virtues of Midnight Express

To score a visual hit and, at the same time get your message across, is not always easy. Text bending can distort words, and make them unreadable, so it is good to be able to experiment. A new release from called *Midnight Express* from Dabhand Computing aims to help you do exactly that.

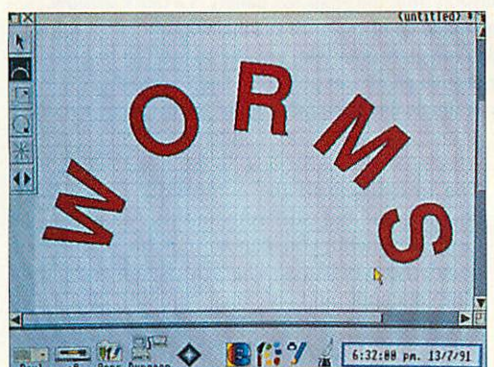
Several applications presently let you bend words, such as Risc Developments' *Typestudio* and ICS's *Fontasy*, so how does *Midnight Express* compare to existing applications, and where does it fall short?

The pre-release version does not yet have a manual, but who needs one when people write packages as friendly as this? I immediately got down to creating some pretty words. First you enter your chosen word, or words. Then you set up all of your parameters, such as shadows and curves and then use the star-shaped Create tool to dump your text on the page.

However, we took a more rough and ready method, that no doubt everyone else will take as well. This is to simply dump the untouched text on a page in default format, and stretch and squish it at leisure. Luckily, *Midnight Express* operates in such a way that each individual component of the text (fonts, spelling and so on) can be altered at any stage, no matter what has happened to it in the meantime.

The first thing I did to my text was change its colour. This is achieved by selecting the text, going into the Fill sub-menu, and picking your favourite colour. The effects of colour change are immediate (no clicking on OK boxes as with *Draw*). This was encouraging: I want things to happen as I do them, and in *Midnight Express* they generally do.

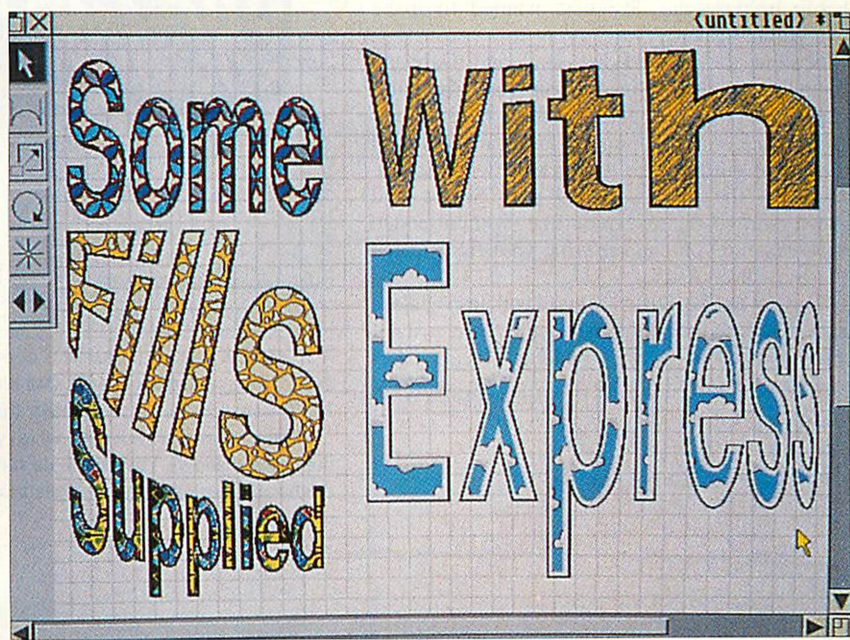
Another option in the Fill menu is a sprite fill, one of the most impressive features. Move away from the Sprite Fill submenu and a dialogue box



Could have used a bit of kerning – but still . . .

pops up with a pattern inside it. Clicking on this pattern fills the inside of the text. The lovely thing is that there is a large range of ready-made patterns to choose from, all accessible by clicking on the arrows in the box. Just look at some of the examples in this feature. You can of course add your own sprites – digitised pieces of wood or stone look particularly impressive.

When a sprite fill is created, there is a small gap between the edge of the sprite and the outline of the text. To solve this we made the outline of the text thicker. This overlaps the jagged edge of the sprite, which you can set up as a default by clicking on the Save Status option on the icon bar menu.



With Midnight Express, variety is the spice of life

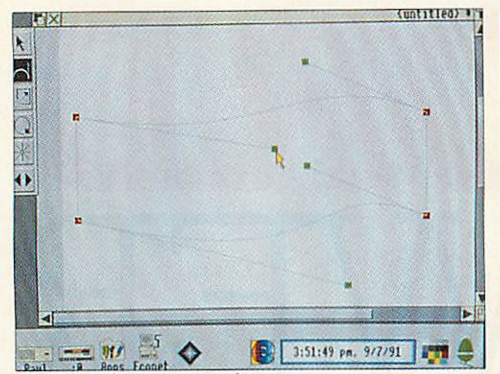
MISSING PARTS

One thing we were looking for in this package was kerning. Kerning means moving characters closer together or further apart, or even off the straight line (up and down). But it was nowhere to be found – a serious omission.

When you put text into predefined shapes, the lack of kerning becomes obvious. Have a look at the screen on the left with the word 'WORMS' in it. As you can see, the W looks too far away from the O. With kerning it could be moved in closer, and would look a lot better.

The fill itself is made up of the chosen sprite, tiled and/or scaled to fit the text. A mask is used so that the sprite appears to be cut out to fit inside the text. One small problem is that to fill a large area of empty text with a sprite takes up a lot of memory. *Midnight Express* complains about this, and it is up to you to adjust the amount of memory given to the application. I hope this will be changed in the final version

Once the text is filled (or left unfilled) you can begin to bend it around. To do this, *Midnight Express* supplies a shape sub-menu. Moving over this gives you an envelope sub-menu. From here you can pick your envelope, in the same way as you pick your sprite fill. The text is then recalculated and squashed to fit. Again the effect is virtually immediate, so you can quickly flick through a selection of envelopes and apply them to your text.


Making a distortion envelope

There are many envelopes to choose from, but if you do want to make your own, then clicking on the second tool down in the window lets you tweak the four bezier points, as shown above. The points of the envelope can be made to move independently or you can link them together. This saves time when you need to move two points, as they move together, rather than you having to drag each one. Unfortunately, Dabhand seems to have shyed away from letting you curve all four sides of the text, but this is probably because the designers wanted to make everything instant.

Scaling the artwork is easy, and Dabhand seems to have taken inspiration from Computer Concepts' *Artworks* package here. The scaling takes place around a point, which can be placed anywhere on the page by clicking with Adjust. Dragging the mouse around with Select held down redraws the text in outline (without added shadows), so you can see what your final scaled version will look like.

This is unlike *Draw*, where you just scale a rectangle around the object, the object itself disappears. This way of scaling objects takes some getting used to and requires accurate use of the mouse, but it is far superior to the *Draw* method in the end.

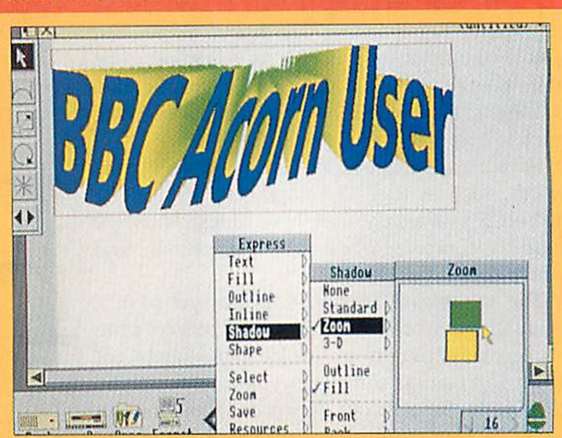


The effect of scaling is shown using grey outlines

Rotation of your text also takes place around a central point that can be changed by clicking Adjust elsewhere on the page. Then holding Select and moving the mouse up or down rotates the wireframe version of your text, while letting go of Select replaces it with the fully rendered version. It's good to be able to see things happening as you do them.

If you want to scale your view of the screen, then two small arrows are provided on the toolbox. There is also a standard Risc OS type zoomer in the main menu. The arrows are great though, and they make things much quicker.

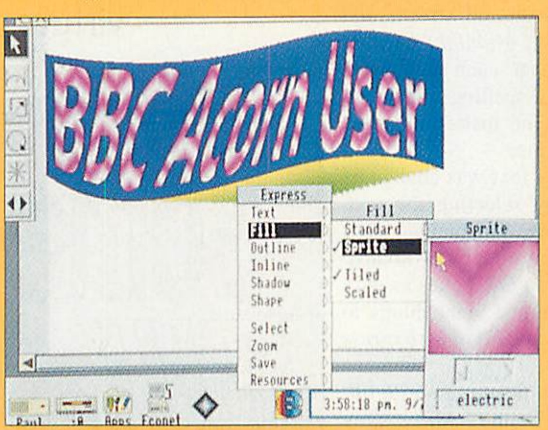
ME AND MY SHADOW



If you really want to make your text stand out, then adding a good shadow can do wonders. *Midnight Express* supplies several types. Again, adding a shadow to your text is a one-click-of-the-mouse affair and it happens straight away.

A standard shadow just repeats the text at an offset. These shadows look best in a light grey, although any colour can be chosen. Dabhand has supplied a neat way of specifying where the light is coming from. In the Shadow dialogue box you simply drag a box representing the position of the shadow behind a box representing the text, and the shadow on the real text is redrawn immediately in the new position.

Our favourite was the zoom shadow. This again is selected by a single click and the shadow appears to zoom off into the distance, as shown above. The vanishing point is specified in the same way, by dragging round a box inside the Zoom Shadow dialogue box. In this box you can also specify how many copies of the text are used between your main text and the vanishing point. The more copies the better it looks, but it takes longer to redraw.



Start and end colours can also be chosen so your shadow can have a graded effect, and this is very effective.

A 3D shadow is much the same as a zoom shadow, except the copies of the text aren't scaled at all, just repeated backwards. One omission from the Shadows gallery is a block shadow. This is a shadow that is solid, rather than made up of copies of the main text.

Plinths are also provided, on which you can place your text, and these, too, can be given their own shadows. You can create star-shaped plinths, or polygons, and the number of sides can be adjusted using the dialogue box. A simple distorted rectangular plinth is shown in the shot above.

The grid loses all the complexity of its *Draw* counterpart, but still remains useful. From the Grid sub-menu you can turn it on or off, and decide how big it is. The grid is shown as light blue squares and is very simple, clean and effective.

Overall, *Midnight Express* is an exemplary example of what can be achieved with a well-written Risc OS package. It's neat and tidy, with no sprawling menus or large dialogue boxes. It's also well planned, intuitive and, quite simply, good fun to play with. And the results are always good. The lack of kerning is annoying, and does spoils things a bit, but for anyone into text manipulation this is a certainly a good package to add to your repertoire.

PRODUCT DETAILS

Product: Midnight Express
Supplier: Dabhand Computing, 5 Victoria Lane, Whitefield, Manchester M25 6AL
Tel: 061-766 8423
Price: £59.95 inc VAT



PROGRAMS

The section that is packed full of programs for you to use

What could be better while on holiday than to immerse yourself in the two best ever type-in games published in *BBC Acorn User*. A Pieces of Eight games special on page 55 revives these classics.

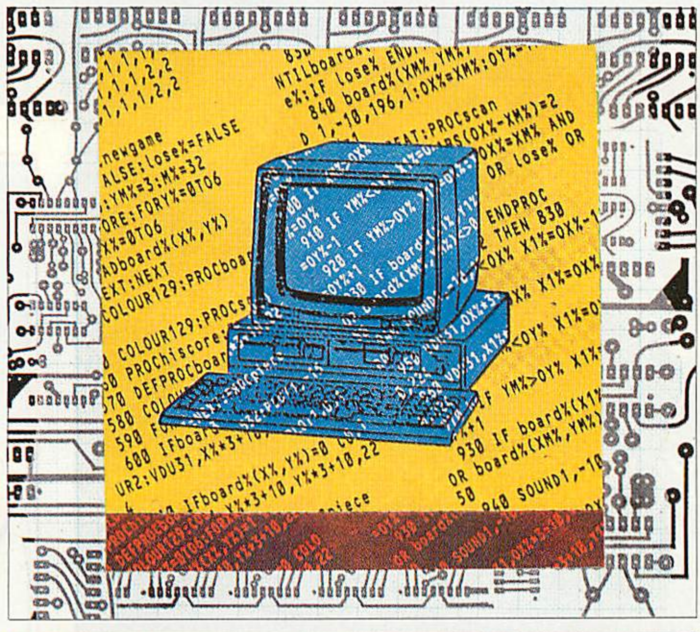
Wizalon is such a simple game, you wonder why it's so addictive. Two wizards have to escape a dungeon by bursting ballons with their pointy hats. To do this you have to control their magic see-saw and launch each wizard into the air in turn, by making sure that the descending wizard comes down on the empty end of the see-saw.

If you get it right, the other wizard will shoot straight into a balloon. Accompanied by clever never-ending music (it's always different), *Wizalon* will have you bursting to get to the next screen, and to get onto the high score table!

Rune Maker: Codename Druid puts you in control of a caped druid on a crusade to assemble an ancient Runestone. Shoot your druidic spells at the inchworms and guards to stop them sapping your energy and climb on the stone monoliths to reach the scattered pieces of the Rune. It's a multi-screen adventure so you'll have to spend some time searching the detailed landscape, all the time watching for the lightning bolts.

Both games run on eight-bit machines but we've modified them to run on 32-bit machines as well, you'll find both games on the 3.5in and the 5.25in subscribers disc this month.

For those of you new to the computing world, Sarah Burns takes a simple game and explains how it all works. Read Sarah's article and find out what really happens inside your computer.



CONTENTS

David Radford's sound article concludes on page 61, and it goes out with a big BANG!! This month David gives you one application that will do it all, and more. *Harmsynth* is a desktop application that will have your Arc making all sorts of realistic noises using the techniques covered in the last three articles. Vibrato and tremelo can be added, allowing even more varied sounds. You can play your sounds via the computer keyboard, or even a Midi keyboard if you have one. Unfortunately *Harmsynth* is so big it would not fit on the yellow pages, so if you don't get a monthly disc then do something about it by turning to page 89.

*INFO

Our regular programming hotpot, *INFO is on page 67. This month *BAU* programming gurus Dave Lawrence and Dave Acton feature a programmable scientific calculator, a mind reader, a demonstration of smooth curves and much more besides.

Here at the *BAU* office everybody's favourite this month is the Lorenzian Waterwheel, and we are sure it will be yours too. It demonstrates chaos theory, and is great fun to watch.

Waves have been popular in the last few *INFOs, and this month is no exception. The Daves have a full screen version of last month's *Waves* program for 32-bit users, and eight-bit owners have a carefully tuned machine code routine to wobble points on their screen and create the same sort of effect.

Finally, win £25 with a new feature to *INFO which we hope to repeat in future, the *INFO challenge. This will test your programming skills against those of other readers. This month the Daves ask you to write some routines that will solve a maze in the quickest time possible. Send in your solutions!

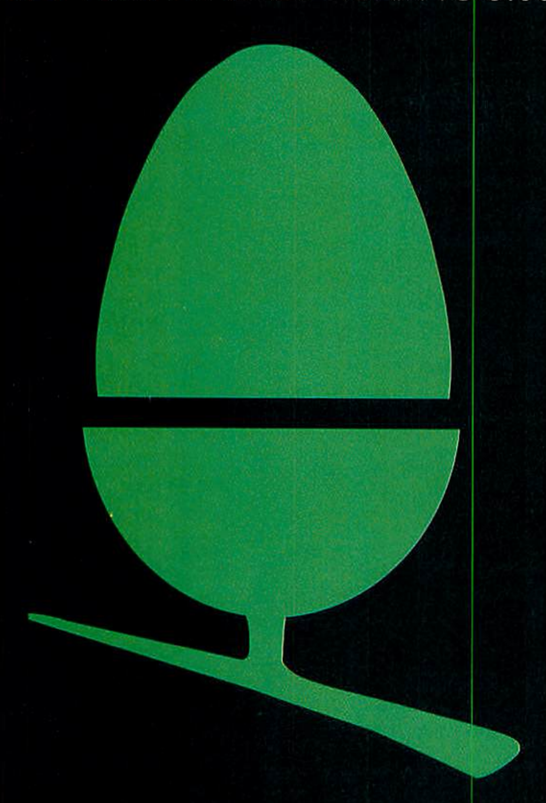
Arc Assembly on page 75 this month tells you how to mix Basic with machine code.

Finally in the *BAU* programming section comes the yellow pages, where you'll find listings from associated articles to type in and play with. See you next month, program pickers.

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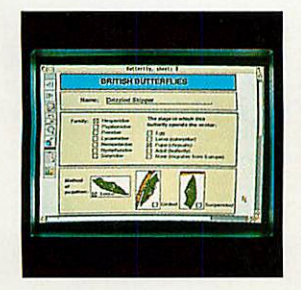
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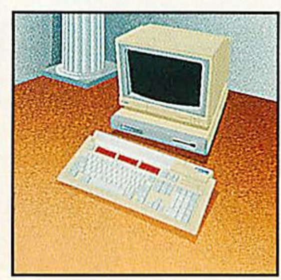
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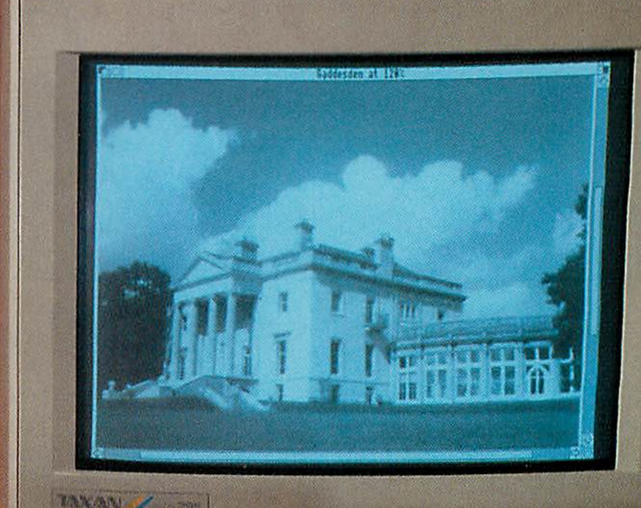
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It's never been easier! The newcomers guide to programming by Sarah Burns

ABSOLUTE BEGINNERS

This month we further your training as a computer genius and explain how to structure a simple game program.

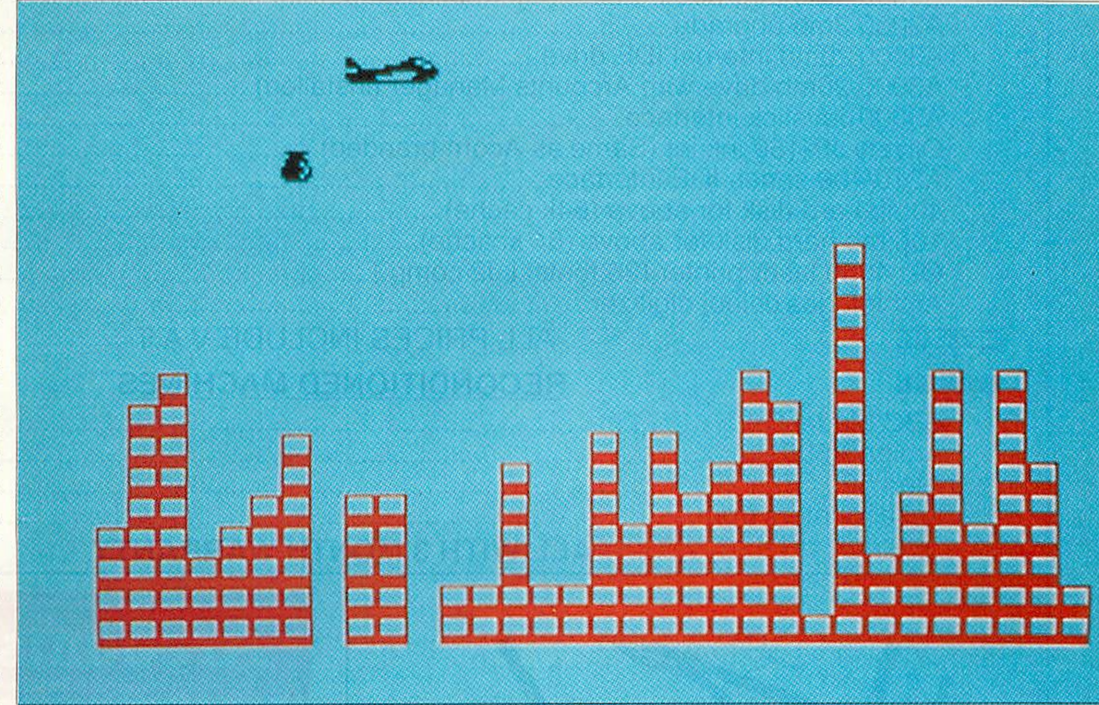
Turn to the yellow pages and carefully copy the program *Bomber*. Type RUN when you've finished. It is long but don't give in! If, after pressing RETURN, you find a mistake, it's never too late to correct it. Using the cursor keys (not delete or copy) place the cursor at the beginning of the incorrect line. Hold down the COPY key and move it along so the line is copied underneath. Stop when you reach the mistake and type in the correction. Use the COPY key to copy the rest of the line. The corrected version will override the incorrect line.

Don't be put off by the messages that the computer screams at you, it's only pointing out a mistake. If you're stuck, find the August issue of *BAU* for a clearer explanation.

As you can see, the progams on the yellow pages begin with REM, short for remark. This is an easy way of labelling a program. *BAU*'s style is to name the program, who wrote it, which machines it will run on and the month it was featured.

These REMs do not affect the working of the program. The computer knows REM is irrelevant and moves on to the next line. The colon is read as a blank line – its purpose is to separate sections and keep the program neat. Again, the computer will ignore a colon.

Each component of the game is in different sections. The buildings, plane, the bomb dropping from the plane, all have their set of orders that determine their look and what they do. After PROC, which is short for procedure, is a description of part of the program. You will see at line 90 the command setup followed at line 100 by PROCdrawbuildings.



Bomber: it's not Lemmings exactly, but all game programmers start somewhere

The computer reads these orders and draws the buildings and the plane. To prevent confusion, the command that creates each component is listed further on in the program, making it easier to read. If you look at line 510, DEF PROCsetup, this is a command to define the procedure 'setup'. So every time the computer reads PROC, it jumps to find the task further on.

In *Bomber* PROCsetup is the command that draws the images. The numbers define characters which look like the bomb and plane. CLS clears the screen and VDU 23 turns off the cursor, otherwise the plane and bomb would be followed by a flashing black lump. Again the REMs have nothing to do with the running of the program. From line 530 to 580 they identify which image each line represents. Each image is also given a number (the number that follows VDU 23). The bomb is identified as 224, the plane tail as 226.

The plane and bomb are printed at lines 350-390. The computer is ordered to print the characters (CHR) 226, 227 and 228. These define parts of the plane.

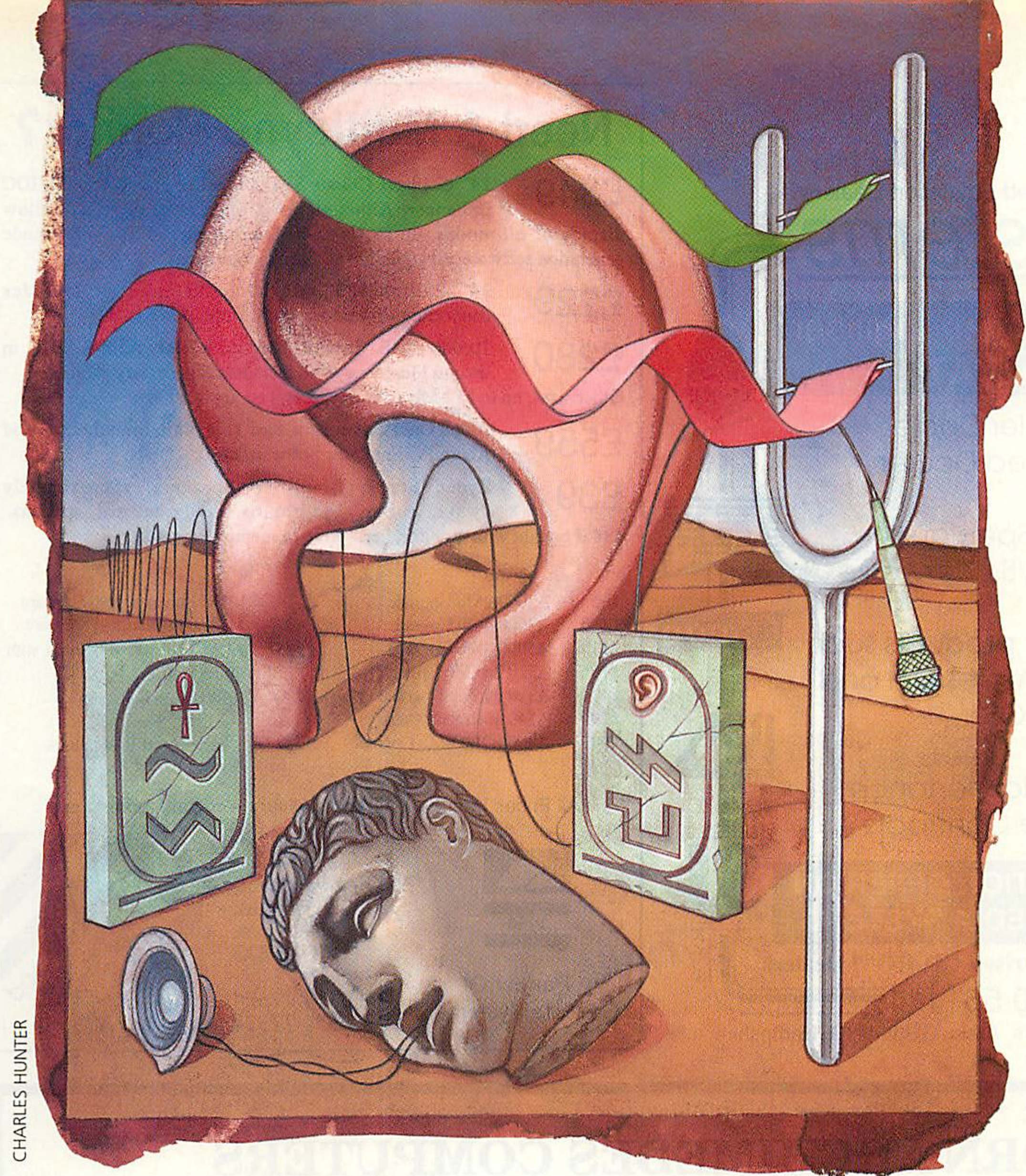
The main loop of the program is at lines 120 to 260. These move the plane across 35 units and down 22 units of the screen. It jumps to the procedures that print the plane dropping the bomb, orders the plane to drop a bomb when the space bar is pressed and when the plane hits a building. If the plane lands, the screen clears (line 240) and a message is printed.

If you find the plane moves too fast, to cheat find line 730. Line 150 is connected with this command. They order the plane to wait 10/100th of a second before moving. So to slow the plane down change line 150 to a suitable delay. A value of 30 would make the game easier.

The buildings are drawn at line 630. Like a graph the y axis is vertical and x is horizontal. We have already seen that 35 horizontal units of the screen are used. The buildings begin at 4 and finish at 35 (line 650). RND means random and, in line 660, the y axis is defined as beginning at 0 and the buildings have a random height of anything up to 15.

To prevent the image of the plane remaining on the screen as it moves, the computer is ordered to delete it, at lines 410-420 by the space between the inverted commas. The computer reads this space and follows the plane with it. The same applies for the bomb at line 430.

The bomb, too, has a set of instructions. At line 280-330, it is given a sound effect and an order to reduce the height of the building when it has been hit. To prevent the image of the bomb remaining on screen when it reaches the bottom a space is printed when the bomb hits the building or the axis.



CHARLES HUNTER

This month, David Radford presents a complete desktop sound generator

WIRED UP FOR SOUND

This month we have something special in store for you. To mark the end of this series, David Radford has written a complete sound editor. Not only does it run on the desktop, but it allows you to mix different types of waves and add tremolo and vibrato.

HarmSynth is fully multi-tasking and can be found on the monthly subscribers' disc. Extra instructions are included for programmers in the *Help* file inside the application directory.

But first, let's recap the lessons of the past few months. So far, we've seen that sound can be represented by a series of numbers and that by inventing our own numbers we can create new sounds. We looked at a couple of simple sound effects, namely echo and fuzz, with programs to illustrate them. Later, we went on to consider amplitude and pitch.

We examined how envelopes can be used to alter the characteristics of a sound over a period of time to produce more realistic sounds and introduced our first working synthesizer, *WaveGen2*, which relied upon the harmonics of a basic waveform to produce its sound.

Last month, we looked at sample periods and how to change them, to allow the transfer of samples from one program to another. Our example program lets you turn a sample into a module, complete with voice generator, so it can be used in other programs such as *Maestro*. We finished with a quick look at real-time synthesis as an alternative to samples. And to demonstrate this, we provided a module which would generate sound effects.

This month our sound program is an accumulation of all these concepts: a fully multi-tasking program. To see it in action, double-click on its icon. Click Select over the icon which appears on the icon bar. A window will appear in the top left corner of the screen. This is the main window. The large, dark grey box in the top left of the window is the wave display, which shows the current waveform graphically. At the moment, as you haven't yet created a sound, it just shows a horizontal white line.

Down the left hand edge of the window are a row of icons. Using these, you can access all the other parts of *HarmSynth*. For now, just click on

the first icon. A window will appear entitled Sine Wave. This window allows you to alter the harmonic content of a sound. Down the left you will see the names of the first ten harmonics: 1st, 2nd, 3rd and so on. Next to each of these is a value showing the percentage of that harmonic which appears in the sound. At the moment, they're all set to zero, so none of the harmonics appear in the sound.

Hold down Select somewhere to the right of the value for the first harmonic. A red slider bar should appear, similar to the type used by the task manager. Dragging this bar left and right will alter the value for that harmonic. At the same time, the waveform display in the main window will be updated. When you're happy with it, release Select. The other nine harmonics can be adjusted in the same way.

When you've had a little play, try selecting the Hear option in the main window. Once switched on, you will be able to hear the sound you are creating. If it begins to get on your nerves, try adjusting the volume or pitch sliders in the main window. (These controls are only for monitoring and have no effect on the final sound). When you're happy, switch the sound off by clicking on the Hear icon again.

If all this seems familiar, that is because *WaveGen2* from our second article let you do exactly the same thing. However, *HarmSynth* is much more powerful than *WaveGen2*. If you go back to the icons down the side of the main window, you'll see that the first icon, the one you clicked on, shows a picture of a sine wave. Clicking on it opened up a window letting you adjust the harmonics of a sine wave. In fact, *HarmSynth* has three other basic waves to choose from: triangle wave, saw-tooth wave, and square wave. These are what the next three icons represent. Clicking on any of these will open up a window similar to the sine wave window, but for their respective wave.

If you think back, *WaveGen2* also had a choice of four different waves, but only *HarmSynth* can use the harmonics of all four at once. Therefore, in total, you have 40 different harmonics to work with. As there are so many, there are four buttons in the main window under the Hear option which allow you to turn off all the harmonics belonging to a particular wave. This can be useful when you're experimenting.

Moving on, the fifth icon down shows a piano keyboard and leads on to the Play sound window. Using this window you can play back your creation musically through the computer's keys or a Midi keyboard (if you have one). The Play button switches playback on or off and the other four buttons control the number of notes that can be played at once.

The sixth icon in the main window opens the Envelope window. In this you should see two large dark grey boxes, which are the envelope displays. You should remember something similar from *WaveGen2*. *HarmSynth* works in a slightly different way though. Instead of drawing the lines freehand, you place several points which are then joined up with straight lines to make the envelope. These points are the little blue rectangles in the envelope displays.

To add a point, click Select in one of the boxes. Use Menu to delete a point and Adjust to move it. The end two points can never be deleted and can only be moved up or down. If the computer beeps at you, you've either tried to delete a point that isn't there or create too many points. If you left the playback option switched on, you can hear the effects of the changes straight away, by holding down a key on the keyboard, say Q.

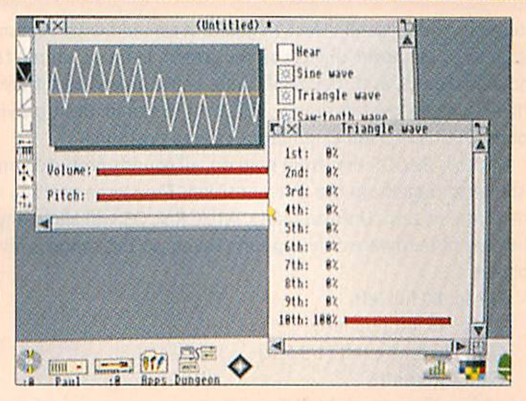
HarmSynth also provides vibrato and tremolo effects, which can be found in the Extras window, accessed through the last icon in the main window. At the bottom are four sliders controlling the speed and depth of tremolo and vibrato. For the best effect keep the speeds fairly high, the vibrato depth fairly small, and the tremolo depth very high. Setting the speed to maximum or depth to zero will disable an effect.

Vibrato and tremolo are only applied to the sound between two markers, known as the vibrato/tremolo limits, and these can be found at the very bottom of the Envelope window. Drag the two small blue rectangles to alter the area affected by vibrato and tremolo, shown in the envelope displays as a light grey background.

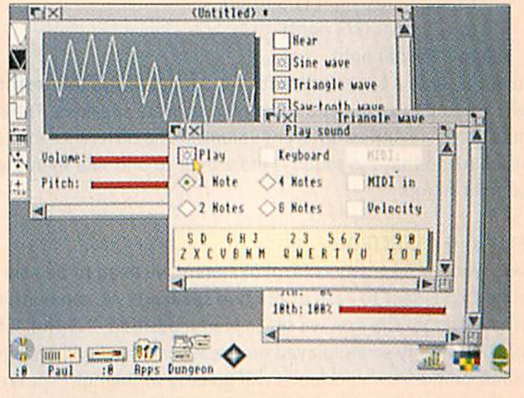
HARMSYNTH IN MOTION

Choosing to add a new wave form is easy enough. But the interesting thing about our program is that it allows you to mix different waveforms together.

In the right hand picture the user is adding the tenth harmonic of a triangle wave. But as you can see the triangle wave form is 'superimposed' on the overall shape of a sine wave. The volume and pitch are altered using the sliding bars shown in the screenshot.

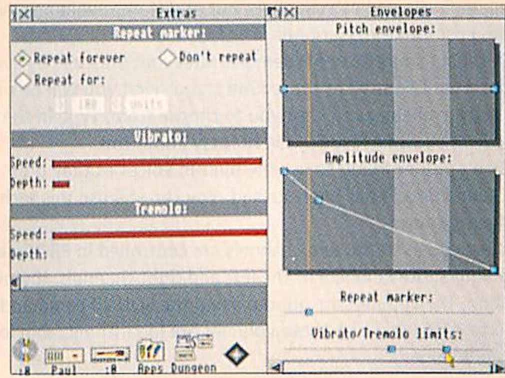


To play the wave that you have created, there are two options. You can use your computer keyboard as a musical keyboard. As you can see from the yellow section in the screenshot to the right, the keyboard is used mimic the layout of a piano. The top line represents the black keys, the bottom line represents the white keys.



Or, if you have the real thing, then you can choose the Midi option on the Play menu. Chords are also an option: but in our example we have chosen to use single notes only.

Our last screenshot shows the way that the program deals with pitch and amplitude envelopes. Both can alter during the duration of the note, as shown opposite. Also catered for are vibrato and tremolo: two musical effects that create a slightly oscillating pitch or amplitude. Finally, the Repeat option allows you to repeat the highlighted section of the envelope.



STEREO SOUND

Stereo is a very useful effect. In games it can add extra realism, with sounds coming from the same direction as the objects on the screen. In music, stereo can help to separate the individual parts, as if they really were being played by different people. Since it's so useful, the Archimedes was designed with built-in stereo. Basic provides a command to control this for us: STEREO <channel number>,<stereo position>

This tells Risc OS that from now on, all sounds produced on that channel will appear to the listener to come from the given position. The stereo position is a value from -127 to 127, with the centre at zero. Unfortunately, while Risc OS will allow any of the 255 positions to be set, the current hardware only supports seven, so this range is divided up into seven groups as follows:

- -127 to -80 full left
- -79 to -48 left (2/3 left)
- -47 to -16 centre left (1/3 left)
- -15 to +15 centre
- +16 to +47 centre right (1/3 right)
- +48 to +79 right (2/3 right)
- +80 to +127 full right

However, with a bit of ingenuity we can get round this restriction. As you probably know, to hear a sound in stereo you need two separate speakers. The same sound is sent to each of these speakers, but at different volumes. The difference in the two volumes fools our brain into thinking that the sound is more over to one side than the other, hence we hear the sound in stereo.

SETTING THE CONTROLS

If we want to take over control of stereo, we need to be able to control the amount of the sound that is sent to each of the two speakers. We can do this by using two sound channels instead of one. The first we set to stereo position -127 (full left) and the other to +127 (full right). Now, any sound played on the first channel will only go to the left speaker, and sounds on the second channel will go only to the right speaker. By playing the same sound simultaneously on both channels, but at different volumes, we can have full control over the stereo position of that sound.

Our first listing, *Stereo1*, demonstrates that principle by sweeping a sound left and right across what is known as the 'sound stage'. First you will be presented with a list of all the currently available voices for you to choose from. Type in the name of your chosen sound *exactly* as shown – Risc OS is very fussy about this.

Don't bother trying to use the built-in voices as they don't allow you to alter the volume of a sound once it has been started. You can still use this technique on them, but only for stationary sounds.

The volumes of the two channels are controlled in PROCfakestereo, which takes four parameters: the numbers of the left and right channels, the pitch of the sound and the stereo position. The volumes are altered using the SOUND command with volumes in the range &180 to &1FF, although these volumes are logarithmic, so a lookup table is needed to find the right value.

ECHO

Now that we know how to produce stereo sound, it may be worth taking a look at how other special effects can be modified to include stereo. As an example, let's take a peek at stereo echo.

You may remember from the very first article, a program to add echo to a sample. To recap, echo occurs when a sound bounces off objects in a room to reach the listener. As these reflections are not coming directly from the loudspeaker (or whatever) they arrive some time after the main sound, causing an echo.

The main differences between the normal echo and the stereo echo are that the stereo version takes into account the direction of the echoes and produces two samples: one for each ear. Unfortunately, this also makes it much more complicated.

For each channel, the input is mixed with a certain amount of the signal coming out of the delay buffer and fed to the output. Some of this output is then fed back into the delay buffer, as in the original echo program. However, before it reaches the buffer it is first mixed with some of the output from the opposite channel. The main reason for this is to allow interaction between the two sound channels, just as there would be in real life. But not all of this mixed signal is fed into the delay buffer. The previous contents must first be mixed with it to cater for multiple echoes of the sound.

All this is done by our second listing, *Stereo2*. First you will be asked for input and output filenames for the samples. Actually, two output samples are created: one is given the suffix L and the other R. For the data, try using the following values to get you started: 4, 5, 50, 50, 40, 50, 40, 60. Both samples must be played back together with opposing stereo positions for the full effect. Try turning them into modules and playing them through *Maestro*.

Dave Lawrence

Immediately above this is another control affecting the position of what is known as the repeat marker, shown in the envelope displays as a vertical orange line. At the moment the repeat marker has no effect as it has not been enabled. To switch it on, click over the Repeat forever button at the top of the Extras window. Now, when any sound you play reaches the repeat marker it will wait there until the key is released. This has the effect of freezing the pitch and amplitude envelopes.

You can also specify a maximum length of time for the sound to wait for by clicking select over the Repeat for button in the Extras window, then using the two arrows underneath it to alter the time displayed in the box.

Finally, I'll leave you with a few sample guidelines. First, make use of the *Armadeus* format, meaning one byte gives the sample period in microseconds, followed immediately by the sample data in linear signed format. This will improve compatibility with other programs. The file type for *Armadeus* files is &D3C.

Second, try to restrict yourself to the three main sample periods: 24µs (high quality), 48µs (medium quality) and 96µs (low quality). In particular, try to use 48µs where possible, as this is the default for the sound system, and therefore the most likely of the three to be compatible with other programs.

If you've found these articles of use in writing your own programs, why not send them in to us at *BAU*? Who knows, it could be your programs we'll be seeing here in future!

SPEAK UP!

No matter how good your sounds are, you need to be able to hear them. A300, A400 and, indeed, A5000 owners may have noticed that they only possess one weedy little speaker. A3000s are slightly better off and at least have the requisite two for stereo sound. Either way, sound output is decidedly naff.

You may have noticed a jack plug hidden away on the back of the machine that you can connect to headphones or your hi-fi. Well at least you get some volume, but what about the treble? Why does it sound as though your speakers are submerged in a vat of treacle?

Well, this is all down to Acorn's filtering circuit, which is not particularly wonderful. Help is at hand though, in the form of Ray Maidstone's all singing, all dancing hi-fi adaptor. This little board fits inside your machine and dangles two phone connectors out of the case. If you connect these to your hi-fi, I think you will be suitably impressed.

The board simply plugs into 300s, 400s and 5000s, requiring three flying leads to be connected internally, A540s need a touch of soldering. A3000s involve quite a bit of 'surgery' and Ray recommends that you send your machine in to be upgraded, although he is working on a more 'user friendly' version.

PRODUCT DETAILS

Product: Mark III hi-fi board
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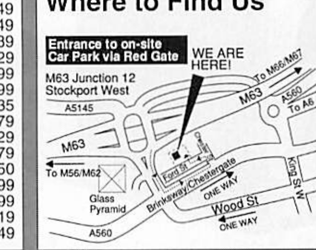
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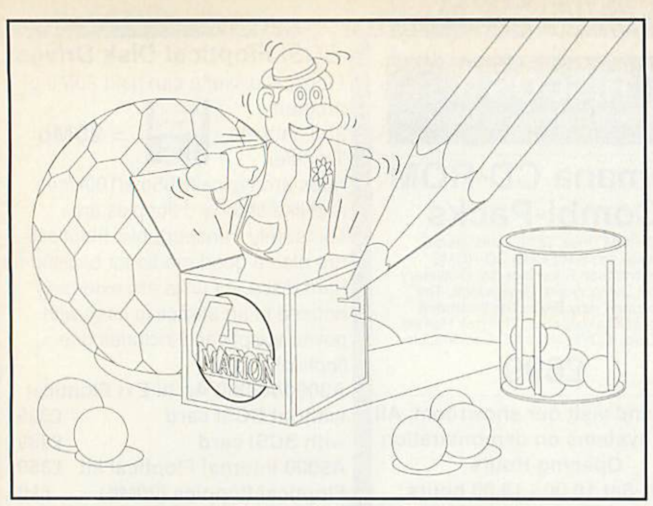






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Illustration by Hans Rijnen



*INFO

Dave Lawrence and Dave Acton present their monthly mix of programs, for all Acorn users

STAR PROGRAM

CALCULATOR

Program: SciCalc
Description: Desktop scientific calculator
Author: Steve Douglas
Machine: 32-bit
Listings: 570, 190 lines Basic

This desktop calculator should cater for most needs, whether you are a student, teacher, mathematician or simply want to work out your miles-per-gallon when you fill up in litres. First create an application directory called *!SciCalc*. Then enter and save *!RunImage* in this directory. Finally, enter *MakeDat* and run this inside *!SciCalc* to create the files *!Run, !Sprites* and four menu files. If you like, you can leave out the data for the sprite file (*MakeDat* lines 1570 to 1860).

Finally, double-click on *SciCalc* to use the program. You are presented with a standard calculator display. Just click on the buttons as you would with a normal calculator.

On the left are the numerals, zero to nine, the sign change button, +/-, and the decimal point. To the right of these are the basic arithmetic functions. There are coloured green to show that they expect two operands. All two-operand functions are green (2+2, 4^5, 4 EOR 8) and all unary operators are light blue (SIN 4.5, 4 in-cm). The calculator has a memory and the four light blue keys provide clear, store, recall and add to memory functions. At the top of the calculator are bracket keys (you may use up to nine levels of brackets within calculations). Next to these is the HEX button which toggles the display between decimal and hexadecimal. On the far right is the CLR button which clears the current result or cancels an operation. It also clears any error. To the left of this is D/R which toggles between degrees and radians.

SciCalc has one special buttons, Menu, that brings up a menu of other keypads. Currently you have a choice of Math (general mathematical functions), Prog (programming and logic functions) and Conv (conversions). The whole block of 25 keys under Menu

SciCalc												
Deg				(	)	HEX	MENU	D/R	CLR
42				CM	A	B	SLL	AND	&F
7	8	9	/	SM	C	D	SRL	OR	&FF
4	5	6	*	RM	E	F	SRA	EOR	&FFFF
1	2	3	-	M+	NOT		SBIT	MOD	
0	+/-	.	+	=	BIT	INT	CBIT	DIV	

The desktop calculator has a host of useful functions, from standard memory recall to logic functions

HOW TO PROGRAM SCICALC

You can reprogram any of the 25 keys on any of the 25 available keypads – 625 programmable keys in total. To add a new menu, or change the name of one, click on Menu with Select. Then click on one of the orange menu keys with Adjust. Enter the new legend in the box provided then click on = to set or CLR to cancel.

To add or reprogram a function key, first bring up the desired keypad using Menu. Then click on the key to be reprogrammed with Adjust. The legend, number of parameters (zero to two) and expression for that button are shown. Click on these and enter as appropriate. Then click on = to set or CLR to cancel. The number beside p determines the type of the function: p=0 means the value is a constant. An example is the &F key on the PROG keypad.

p=1 means the function is monadic and should be expressed in terms of a single operand x. An example is x^2, whose expression is simply x*x. p=2 means the function is dyadic and should be expressed in terms of two operands x and t. An example is AND on the PROG keypad. Its expression is t AND x. The hex digits A to F are not provided on the main calculator but you may want to include them as extra keys on a keypad (as PROG does). Simply name them A to F and enter A to F as the p value. Their expression slots should be blank.

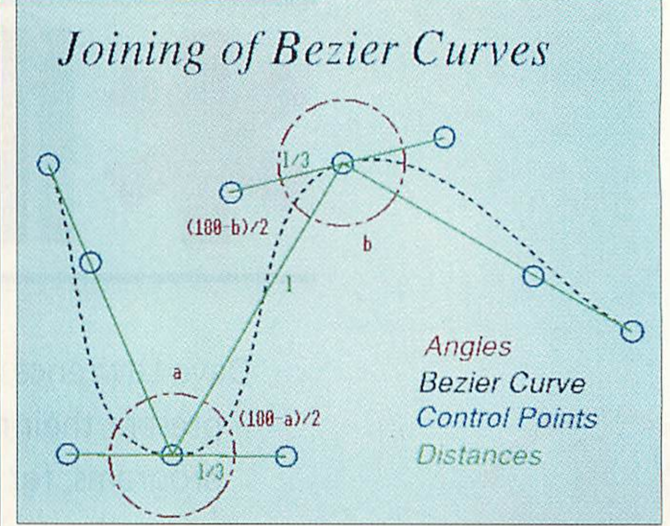
Or you may want certain keys to invoke Basic functions. This can be done and x! is an example. Simply add your Basic function to the end of RunImage (like FNfact) and then include it in the expression slot. The expression for x! is FNfact(x).

To display angles in degrees or radians and functions that act on angles need to take account of this. The function FNcvtr(x) returns its argument in radians. If the calculator is set to radian mode x is left unchanged, otherwise it is converted from degrees to radians. Examples are SIN and COS. Inverse trigonometrical functions need to perform the opposite conversion and FNcvfr(x) is provided. This takes an angle in radians and converts it (if necessary) into degrees. ASN and ACS are examples. After reprogramming, an altered keypad will be saved within the SciCalc directory.

SCICALC FUNCTIONS

There are three additional keypads for MATH, PROG or CONV functions. Below we describe each key available

MATHEMATICAL FUNCTIONS		
SIN	SIN(FNcvtr(x))	Sine x
COS	COS(FNcvtr(x))	Cosine x
TAN	TAN(FNcvtr(x))	Tangent x
LOG	LOG(x)	Log x (base 10)
LN	LN(x)	Log x (base e)
ASN	FNcvfr(ASN(x))	Arc-sine x
ACS	FNcvfr(ACS(x))	Arc-cosine x
ATN	FNcvfr(ATN(x))	Arc-tangent x
10^x	10^x	Antilog x (base 10)
e^x	2.718281828^x	Antilog x (base e)
xRTy	10^(LOG(t)/x)	yth root of x
SQRT	SQR(x)	Square root x
x!	FNFact(x)	x factorial
lxl	ABS(x)	Absolute x
y^x	t^x	y to the xth power
x^2	x*x	x squared
1/x	1/x	1 over x
e	2.7182818282	Constant
PI	PI	Constant
PROGRAMMING FUNCTIONS		
A		HEX entry key
B		HEX entry key
SLL	t<<x	x shift left logical y
AND	t AND x	x bitwise AND y
&F	&F	Constant
C		HEX entry key
D		HEX entry key
SRL	t>>>x	x shift right logical y
OR	t OR x	x bitwise OR y
&FF	&FF	Constant
E		HEX entry key
F		HEX entry key
SRA	t>>x	x shift right y keep sign
EOR	t EOR x	x bitwise exclusive OR y
&FFFF	&FFFF	Constant
NOT	NOT x	Invert all bits
SBIT	t OR 1<<x	Set bit x in y
MOD	t MOD x	Remainder after y/x
BIT	1<<x	Value of bit x of y
INT	INT(x)	Chop off decimals
CBIT	t AND NOT(1<<x)	Clear bit x of y
DIV	t DIV x	Integer divide
CONVERSION FUNCTIONS		
in-cm	x*2.54	Inches to centimetres
M-km	x*1.61	Miles to kilometres
oz-g	x*28.3	Ounces to grams
lb-kg	x*0.454	Pounds to kilograms
gal-l	x*4.55	Gallons to litres
cm-in	x/2.54	Centimetres to inches
km-M	x/1.61	Kilometres to miles
g-oz	x/28.3	Grams to ounces
kg-lb	x/0.454	Kilograms to pounds
l-gal	x/4.55	Litres to gallons
F-C	5/9*(x-32)	Fahrenheit to Celsius
hp-kw	x*0.746	Horsepower to kilowatts
lbf-N	x*4.45	Pound-force to Newtons
Bt-kJ	x*1.06	BTU to kilojoules
ps-kP	x*6.89	PSI to kilopascals
C-F	9/5*x+32	Celsius to Fahrenheit
kw-hp	x/0.746	Kilowatts to horsepower
N-lbf	x/4.45	Newtons to pound-force
kJ-Bt	x/1.06	Kilojoules to BTU
kP-ps	x/6.89	Kilopascals to PSI



is redefined according to the selection you make. You can use keys instead of clicking on the buttons. First give *SciCalc* the input focus by clicking on the numeric display. The title bar will change to yellow and you may now use the key short-cuts shown in the figure below. On the left is a list of all the functions that come with *SciCalc*.

KEY SHORTCUTS FOR SCICalc

Key	Button equivalent
0-9	0-9
+ - * /	+ - * /
= Ret Ent	=
Home	CLR
Delete	CM
Copy	SM
Up	RM
Down	M+
#	HEX
\	+/-

MIND READER

Program: MindRead
Description: A telepathic program
Author: Robin Owens
Machine: All
Listing: 30 lines Basic

Mind reading isn't that hard. In fact, even your Beeb can do it! When you enter and run *MindRead,* you should press 0 and 1 in as random a fashion as you can manage. The computer will try and guess your next key press each time.

After each guess, two figures are shown. The first is the percentage it guessed correctly. The computer also makes a random choice of its own and the other figure is the percentage of these it got right. The disturbing thing is, however random you think you are being, it always seems to score well over 50 percent.

BEZIER JOINING

Program: Smooth
Description: Allows smooth joins between Bezier curves
Author: David Walters
Machine: 32-bit
Listing: 100 lines Basic

More and more people are seeing the benefits of object-based drawing packages such as *Draw.* And one of the main parts of any such program is the Bezier curve. Over the months, we have shown a number of different ways to plot Bezier curves and David does not receive the prize for yet another plotting method, but instead for demonstrating how Bezier curves can be joined together and edited in a way that allows smooth joins between the curves.

To operate David's program use the Select button to plot a series of points on the screen then press Menu to plot the last point and draw a smooth curve through them all. The curve can then be altered by dragging it with Select. The program will keep the curve smooth no matter where you drag the points and is far better than *Draw.*

The figure above explains the principle used by David's program. The trick is to keep the same tangent for the ends of adjacent curves and this can be performed with a just a handful of trigonometrical equations.

Interestingly, *Draw3,* in Risc OS 3, does go a little way towards a remedy. The Edit path menu contains an extra option, Flatten Join, which

does just that and dragging a control point with SHIFT held down will drag the attached control point as well, keeping the curve smooth. *ArtWorks*, meanwhile goes the whole hog and moves control points as you drag points on the curve.

CONTRAST CONTROL

Program: Contrast
Description: Nine-pin, dot matrix printer aid
Author: P Drinkwater
Machine: 32-bit
Requirements: Install and set up printer driver before using the program
Listing: 210 lines Basic

Any grey scales used in *Draw* files are likely to be printed out too dark on nine-pin printers, as Mr Drinkwater points out. His short utility allows you to adjust the brightness and contrast of *Draw* files prior to printing.

Before running *Contrast* enter the desktop and install and set up a suitable printer driver, such as *PrinterDM*. Mr Drinkwater's program requires the module PDriver to be present since a PDriver SWI call is used to find out the current resolution for printing.

Run *Contrast* and give it a source and destination name. The source should be a *Draw* file. Then enter values for contrast and brightness. These are in the range -100 to 100 depending on whether you want to turn them up or down. These controls are similar to those on a television.

The source file is then processed and an adjusted copy is made. The destination file can now be printed. One limitation is that 256 colour sprites are not supported. Also, all sprites present in a *Draw* file should have a palette. However one can easily be added with *Paint* if necessary.

Program: BandC
Description: Palette changes
Author: Mark Brundale
Machine: 32-bit
Listing: 30 lines Basic

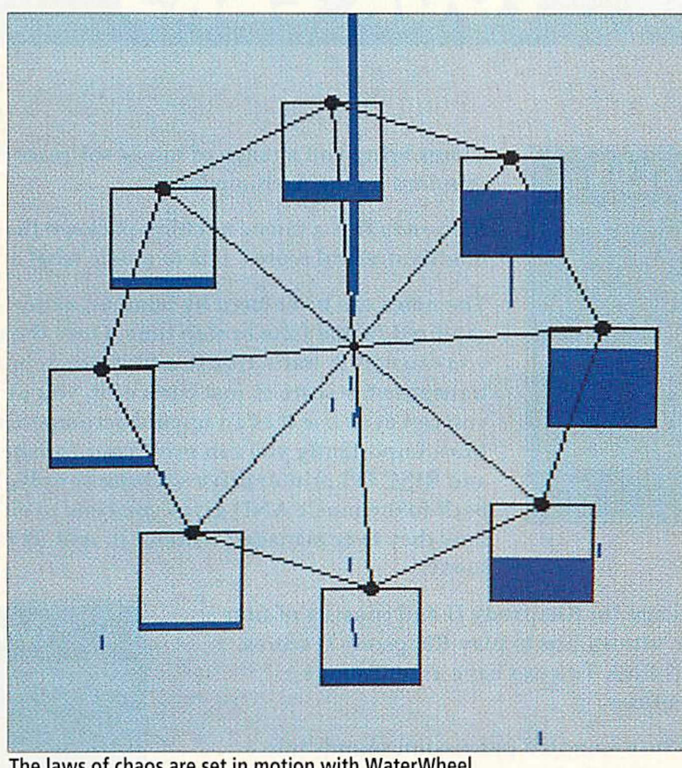
Continuing the theme, have you ever wondered exactly what the brightness and contrast controls on your TV actually do? No, we haven't either, but apparently Mark Brundale has! This short little ditty demonstrates them by use of a small Basic routine. The program *BandC* expects a screen to be saved in a file called *Screen*.

You could either use the *ScreenSave command or take a snapshot of the desktop with *Paint*. Once loaded, the mouse can be used to vary the brightness and contrast of the colours.

Moving the mouse left and right will alter the brightness and oddly enough vertical movement will adjust the contrast. If some odd colours start to appear then you are probably trying to play with a 256 colour picture. Sorry, only 16 colour modes are allowed.

Mark has not included a colour control. Can anyone add this missing TV adjustment, or perhaps provide icon bar knobs to change these effects? Of course, it would also be very nice if our *Contrast* program were adapted to sit on the icon bar and work within the desktop.

If any reader wants to try these additions we would be delighted to see the results. See *Quit on p67 for details on how to submit a program.


The laws of chaos are set in motion with WaterWheel

WHEEL MEET AGAIN

Program: WaterWheel
Description: Graphical demonstration of the theory of chaos
Author: Bryan Creer
Machine: 32-bit
Listing: 280 lines Basic

The Lorenzian Waterwheel is a classic example of a chaotic system. Given a surprisingly simple model – a waterwheel – it is impossible to predict the state of the wheel at any given time. If this sounds complex, don't worry! Even if you, like us, don't understand chaos theory, you can still sit back and watch the program.

As Brian explained, the program works as follows. It simulates a waterwheel with only a slight bending of Newton's laws. The wheel consists of a set of leaking buckets which are filled by a constant flow of water from the top of the screen. The weight of the water accelerates the wheel and a small frictional force tends to slow it down.

Using low values for the rate of flow (less than two) the buckets empty by leakage before they reach the bottom and the wheel turns slowly and steadily. At a rate of around four, the behaviour is chaotic. When the wheel is moving quickly, the buckets don't have time to fill as they pass under the flow, so there is some imbalance and the wheel slows down under friction. At slow speeds, the buckets have

BEGINNER'S BIT

Last month we took a look at the logical operators AND, OR and EOR. They crop up all over the place and this month we're looking at one example – using them with the GCOL statement.

The command GCOL is used to specify the colour in which subsequent plots (using DRAW or PLOT for example) are made. It takes two parameters – the second is the logical colour; the first describes the way the colour is to be applied.

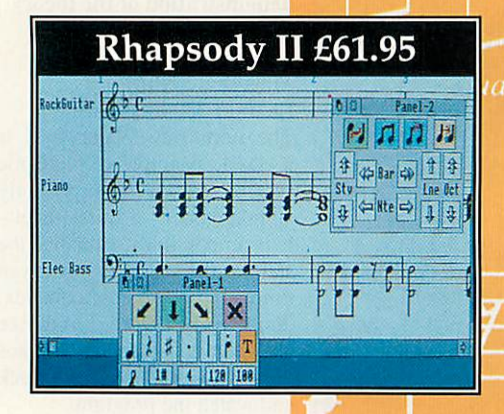
Normally zero is used for the first value and this means 'just plot using the colour specified'. In mode one a GCOL 0,1 sets the colour to red (the value one is 'red') so all plots will be in red. On the Arc you can miss out the first value , in which case it is assumed to be zero. (The command GCOL 1 on the Arc is exactly the same as GCOL 0,1.)

On the other hand, GCOL 1,1 will still specify colour one (red), but the code one means logical OR the colour on to the screen. In other words take the value for the background colour and OR it with the colour value given and then use the result. Similarly GCOL 2,1 means AND the colour on to the screen, and GCOL 3,1 means EOR the colour. To demonstrate this, we have provided two listings called *Gcol8* and *Gcol32*. They are for eight and 32-bit machines repectively. For each GCOL code (zero to three) a set of rectangles are displayed (in mode one) and shapes are plotted on top of them in the way specified by the GCOL. The numbers across the top show the colour of the base rectangles (zero to three). The numbers down the side show the colour of the shapes applied on top. For GCOL 0,X the results are as expected.

Press a key to see GCOL 1,X. Here each shape is ORed on to the rectangle. So when a red shape is ORed onto a yellow rectangle, the resulting colour is red OR yellow = 1 OR 2 = 3 = white. On the next screen you can see red ANDed with yellow which produces 1 AND 2 = 0 = black. The final screen shows exclusive ORs (EORs). Here you'll notice that EORing with white produce the 'opposite' colour.

More often than not, you'll only need to use GCOL 0,X but the other codes can come in useful sometimes. For example, if you use GCOL 3,X and plot a shape, repeating the process will 'unplot' it.

PROGRAMS TO BRING MUSIC TO YOUR EARS



Clares bring you a range of music software that is fast becoming the standard on the Archimedes.

Rhapsody II is a music notation package that allows you to write and modify musical scores. It is to music what a word processor is to words.

The notes can be entered by hand or, using a Midi keyboard, they can be captured in real time or step time. Once the music has been captured you can edit it, transcribe it, add lyrics, repeats, trills, slurs etc. You can transpose the score or just parts of it, you can play it back through Midi, you can even use it as an unpaid accompanist to your practice sessions. Most importantly you can print your finished score using any printer and RISC OS printer drivers. Quite simply, Rhapsody II lets you get back to the music AND gives you time to enjoy it. Many users wonder how they ever managed without it! Ask us for a demonstration version today.

Vox Box £61.95

Vox Box is a supporting package for Rhapsody II and consists of four programs. The first, *Perform,* allows you to play Rhapsody II scores, Armadeus samples and Midi files. You can have a continuous performance of your compositions.

VoxBeat is an application to turn sampled percussion sounds into a useful voice module that provides realistic percussion accompaniment to your scores.

VoxSample converts sound samples into usable Archimedes voices. You control which part of the sample is used to create the voice and you can also define the sound's envelope. The resulting voice module is much smaller than the original sample and sounds much better.

VoxSynth is a more complex application that enables you to digitally synthesise voices for use in the Archimedes. Voices are produced by drawing waveforms or harmonics. You even have a form of FM synthesis available. *VoxSynth* is also useful in the science laboratory as it deals with waveforms, harmonics, FFT and FM synthesis.



ScoreDraw is another support program for Rhapsody II. It produces high quality printout of music scores. Together *Rhapsody II* and *ScoreDraw* form the heart of a complete Archimedes based music publishing package. *ScoreDraw* takes a score from *Rhapsody II,* or the original *Rhapsody,* and converts it into a series of Draw files. The results are of true professional publishing quality – especially when printed on a laser printer.

ScoreDraw has its own library of music symbols and it uses these to construct a high quality score. Any text within the score is converted into user selectable outline fonts, if they are available. An additional user library is also supplied which provides items such as hairpins and grace notes.

In addition to improved print quality *ScoreDraw* also concentrates more on the formatting of the score. Because the score is handled differently and *ScoreDraw* is not required to 'play' the score it can spend more time on good presentation.

And there's more... Look out for two more music packages coming from the Clares stable soon. And don't forget our Armadeus Sound sampling board if what you are interested in is recording and manipulating sound rather than music.

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time to fill and accelerate the wheel. The speed increases, decreases and reverses in a chaotic manner. At flows between two and three, behaviour is chaotic for a while and then settles down to a steady state.

If you press ESCAPE while the wheel is spinning, it will display a graph of angular velocity against time and another press will give a phase diagram. This plots the angular velocity against angular acceleration. A point on the diagram represents one state of the wheel. There are two attractors present: constant speed clockwise and constant speed anticlockwise. At low rates of flow, the wheel will move quickly to one of them. At higher rates it will circle first one then the other, either indefinitely or until it finally settles into one of them. Only about three minutes worth of data is stored, so if you run for longer than this, it overwrites the earlier data.

Pressing ESCAPE again gives the option to continue where you left off or stop the simulation. Now, all we are looking for is a one line version and an eight bit version. Any offers?



Wave32 gives a screenful of waves on your Arc

MORE WAVES

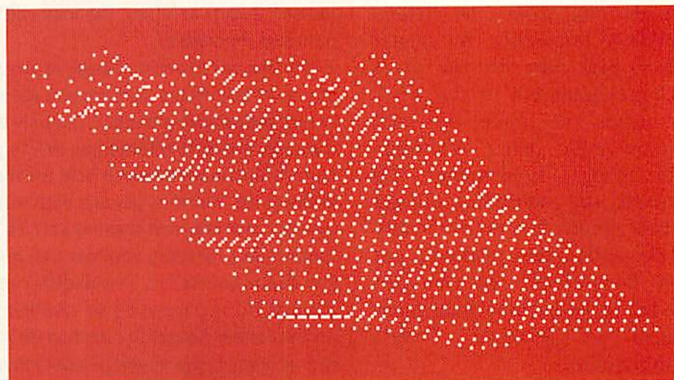
Programs: Wave8, Wave32
Description: Graphical demonstrations
Author: Dave Acton
Machine: Wave8: all eight-bit machines, Wave32: 32-bit
Listings: Wave8: 260 lines Basic and machine code, Wave32: 180 lines Basic and machine code

Much inspired by Michel Grimminck's excellent *Waves* program last month, we have been optimising and generally fiddling to see if any more speed could be squeezed out of your Arc. And the net result is *Wave32*.

Wave32 uses exactly the same formula as Michel's original, applying it to a 128 by 128 pixel grid. The display is now doubled up (each pixel is a two by two square) so it fills the screen. Simply run and watch. You can adjust the scale with the + and - keys.

Two wave sources are located at opposite corners and these produce an interesting oscillating pattern after a while. Of course you could easily alter the source by changing a couple of lines of Basic. The program runs at quite a respectable speed by making full use of multiple LOAD and STORE commands.

There are two main loops. The first (at .add) adds the velocities to the heights of the points and plots them at the same time. They are dealt with four at a time for speed. The other main loop (at .loop) calculates the new velocity for each point using Michel's formula. There are just enough Arm registers to permit this to for two points at a time!



At last! Waves for eight-bit machines, with Wave8

We thought it was a bit of a shame that eight-bit users couldn't have fun with waves, so after many hours of code-crunching we are happy to present them with *Wave8*. Again the formula used is Michel's, but 16-bit values are used throughout (or your poor Beeb would probably give up the ghost altogether). Even so, with a 32×32 three-dimensional grid of points we think you'll enjoy the result. *Wave8* achieves its speed by careful assembly. There are 1024 points (32×32) which means 1024 low and 1024 high bytes for the height and velocity of each point. The 6502 is always happiest dealing with 256 byte tables though, so the array of points is really treated as four 256 groups.

Separate code is assembled to deal with each group and this allows the absolute, X addressing mode to be used rather than the slower (indirect) Y. It also means that you end up with quite a lot of program. However, because the code for each group is very similar, a loop is used in the listing to produce the four sections of machine code.

One corner is waggled up and down sinusoidally and the ripples move out across the grid. Eventually a pattern emerges that is similar to the one produced by *Wave32*. Mode four is used, mainly

because memory is needed for the height and velocity tables as well as the code.

VOWEL PLEASE, CAROL

Program: CDwords
Description: Cheat your way through Countdown
Author: Tony Dibble
Machine: Eight-bit
Requirements: SpellMaster Rom
Listing: 80 lines Basic, 100 lines machine code

Tony's program allows you to play along with the Channel 4 Countdown game show, and possibly even beat some of the long words that the guests come up with.

For some reason, Countdown, the popular TV quiz show seems to be high in the minds of Acorn users this year. In the March and June issues we carried programs that calculated solutions to the 'numbers' part of the show. This month, we complete the computer cheating with Tony Dibble's word game solver.

For those of you unfamiliar with the show, the two contestants pick nine letters from two piles. One is all consonants, the other vowels. Carol Vorderman places these letters on a rack, scrabble style, and the contestants have 30 seconds to find the longest word made up from the letters picked. Invariably, no matter how well they do, the guest Gyles Brandreth of the week manages to come up with some eight letter Victorian gardening implement. Of course, the contestants still get their points, but do we really believe the guest worked it out by themselves? No! We just want to know how they managed to smuggle Tony's program in!

The program *CDwords* is based on the routines in my word games article in the January 90 issue. In that article I showed how a couple of Rom calls could gain access to the dictionary stored in the *SpellMaster* Rom.

Tony almost gave up writing this program until he noticed that the entry points published in that issue were not correct for his version of the Rom (he had 1.67, we had 1.69). He has, as a result, supplied a second program *FindSM* to track down the entry points for any version of Rom. It will also find out which Rom socket your *SpellMaster* is in. This value must be set in the main program. If you already know where your Rom is, you can simply change line 160 as appropriate. Using the program could not be easier. Simply enter the nine letters as they are picked and then press RETURN. The program finds all the subwords, and lists them starting with the longest. It should only take about 30 seconds to find them all.

MEET THE CHALLENGE!

We know how much *INFO readers like a programming challenge, so we thought we'd give you something to puzzle about. Test out your programming skills, solve this classic problem and you could earn yourself £25.

Imagine a man standing in the centre of a maze. There are no lights and he has to feel around to find the walls. Somewhere at the edge of the maze an amulet is hidden. Your task to guide the man to the amulet using the shortest route you can.

The program *Challenge* creates ten such mazes, each 15 by 15 squares in size. The man is placed at the centre and the amulet at a randomly chosen point on the perimeter. You must guide the man by providing intelligent procedures and these may be appended to *Challenge*.

As an example, we have provided *Follow*. Append this to *Challenge* and then Run. This solution simply follows the left hand wall until the amulet is found. It is not particularly quick and to make things trickier, about half the mazes will have islands in them so *Follow* might well take him round in circles!

After 10 mazes, the number of mazes solved and the number of moves this took is displayed. Any route taking more than 1000 steps is abandoned.

And now for the rules, which are as follows:

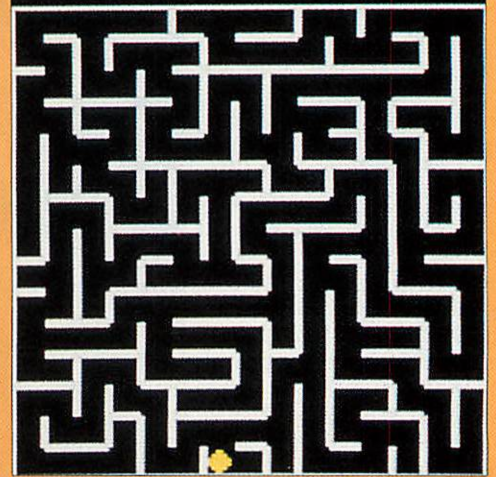
1. You must supply three Basic procedures and functions: PROCsolve_setup, PROCsolve_newmaze and FNwhichway. PROCsolve_setup will be called once at the start of the program and any DIM statements and so on should go here.

PROCsolve_newmaze will be called once, just after each maze is created, and you can use it to initialise any array before solving takes place. FNwhichway is then repeatedly called, until either you guide the man to the amulet or 1000 moves have taken place. If the latter is the case, the search is abandoned. FNwhichway should return a direction: 0 (right), 1 (down), 2 (left) or 3 (up). The man will move in that direction if possible.

2. You are not allowed to peek at areas of the maze you have not visited. Nor are you allowed to peek at where the amulet is hidden. The only variables you may use, apart from those you define yourself, are manx% and many% which hold the man's position in the maze. You may assume each maze is 15 by 15 squares with the man starting at (7,7). The only function or procedure you may use, aside from those you define yourself, is FNwall(dir%) which returns TRUE or FALSE depending on whether there is a wall on the current square in direction dir%. You can call this as many times as you like per move.

3. You may not alter *Challenge* in any way. Just send us your set of procedures. They must at the very least provide the three essential functions outlined in rule one.

4. You may write your solution on an eight-bit or 32-bit machine. Your solution will be tested on a standard 32-bit Arm2 machine, or if not 32-bit compatible, on a Master 128.



5. If your solution takes more than 20 minutes for any maze, it will be disqualified. It will also be disqualified if any errors occur while running.

6. During judging, the value of seed% will be set to a randomly selected value so that all solutions will be tested on the same ten unseen mazes. This value has been printed and sealed in an envelope to be opened after the closing date. No one has seen it.

7. The winner will be the solution that solves the most mazes. If there is a tie, the winner will be the solution that takes the fewest total moves. If there is still a tie, the winner will be picked from a hat!

We would prefer you to send your entries on disc. Please enclose an SAE. Any discs received will be returned as quickly as possible. We will take copies of the programs and use these for judging. Printed entries will only be accepted if they are fifteen Basic lines or less in length.

And now to the possible strategies. You could try building a map as you go along. Create an array in PROCsolve_setup, initialise it in PROCsolve_newmaze and each time FNwhichway is called, call FNwall for each direction and record the results in the array. To avoid going round in circles, keep a record of which way you went at a crossroad, so you don't make the same mistake twice.

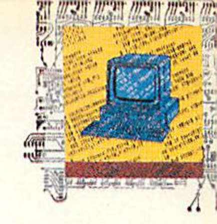
The amulet will always be at the edge of the maze, so paths towards the edge might be better than those towards the centre. There are doubtless many other clever tricks and we look foward to seeing them.

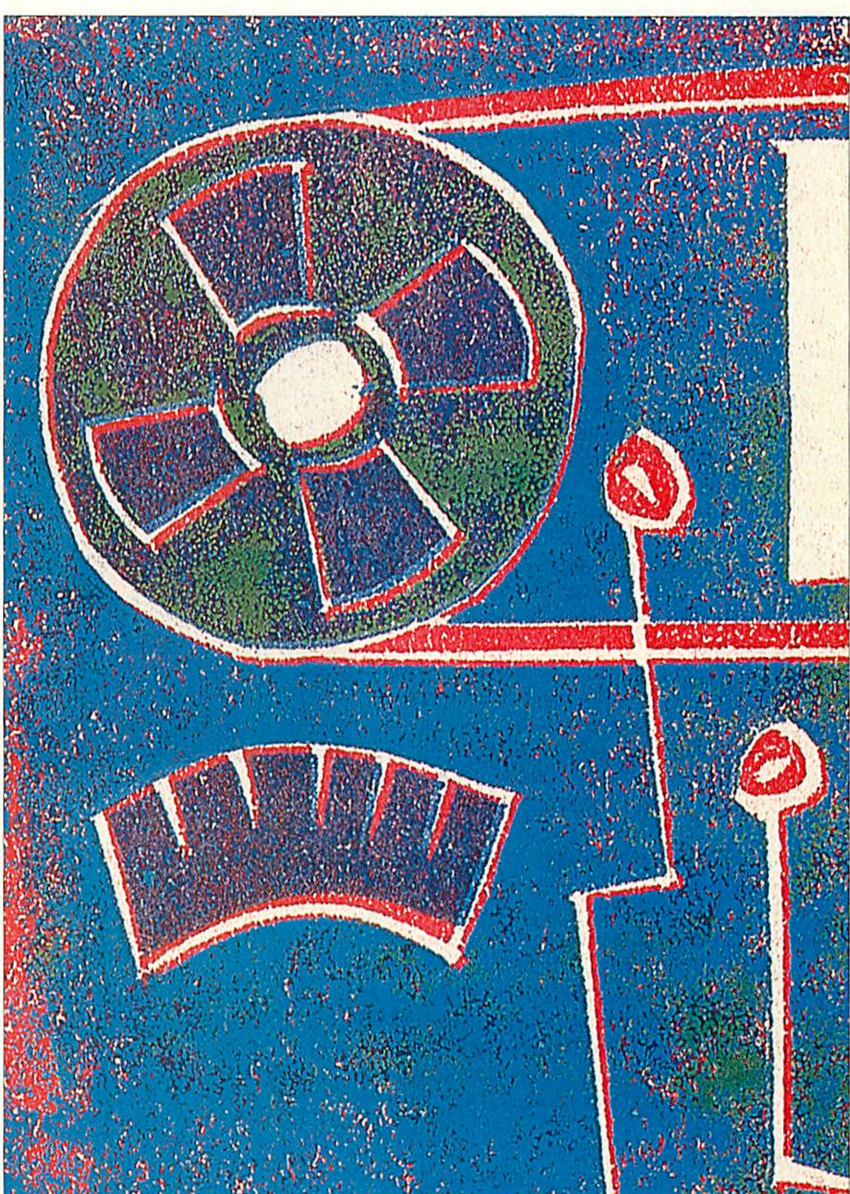
The closing date for entries is September 30th 1992. The winning entry will be published in the December 1992 issue. Any interesting solutions will also be credited and published if there is space. Happy maze-solving!

*QUIT

As always, your contributions shoud be sent to *INFO, BBC Acorn User, Redwood Publishing, 101 Bayham Street, London NW1 0AG.

Daves Lawrence & Acton





ASSEMBLY LINE

More Arm machine coding from Dave Lawrence

So far in our Arm programming series, all examples have been 'processor' based. Occasionally we've printed a star or two and once or twice we've passed values back to Basic by using the USR function. But, in the main, we have concentrated on functions provided by the Arm chip on its internal registers. I'm going to start this month by showing you how to pass parameters to sections of code from Basic before moving on to the important concept of memory access.

PARAMETER PASSING

We have already seen how a single 32-bit value (the contents of register R0) can be returned to the calling Basic program with the USR function of Basic. Although RND and TIME are both functions that can return an output value from no input, they are rare. Most functions need such an input value, so we need a way to able to present data to machine code routines. Luckily there is a handy feature of Basic that does this quickly and simply.

When Basic calls a chunk of machine code (with either CALL or USR) the contents of the integer variables A% to H% are transferred to the Arm registers R0 to R7. So R0 is set to the value of A%, R1 to B% and so on. Registers R8 to R12 are also given 'useful' values, but not, as yet, useful to us.

The first example program, *Arm1*, gives a very trivial demonstration of this facility. Of course you can adapt the principle for your own purposes. *Arm2* shows how a machine code routine can calculate the factorial of a number and is a direct translation of the following Basic function:

```
DEF FNfact(num)
IF num = 0 THEN =num
fact = 1
REPEAT
 fact = fact * num
 num = num - 1
UNTIL num = 0
= fact
```

Note the conditional branch at the beginning to trap 0. Can you see what would happen if we let 0 through to the main loop? Also note the use of SUBS to save us a compare at the equivalent of the UNTIL. There is no error trapping for negative numbers. Try -1 at your peril, but make sure that you have half an hour to spare! Numbers that are too large can also cause problems; 12 is the largest number whose factorial will fit into 32 bits.

As as exercise, try digging out an A-level stats text book and code up the formulae for permutations (nPr) and combinations (nCr). You should be able to make use of my factorial code in your work.

ACCESSING MEMORY

Now let's look at accessing the computer's memory. Once we can do this, we can mess around with arrays, buffers and stacks. This then moves us on to subroutines, local variables, recursion and eventually to direct screen access for fast graphics and sprite routines. But first, you need to know about ST and LD. These are the Arm instructions that store and load data from memory.

Three variations are used to control the exact amount of data that is transferred. It is possible to store (or load) one byte (eight bits), one register (32 bits) or a whole block of registers, merely by changing the suffix of the ST or LD. We will look at the first two to start with.

SIMPLE TRANSFERS

Have a look at our program *Arm3* in the yellow pages. At line 160, we define a label call memory, and store a hexadecimal constant &123456. EQUD is short for equate double and assembles a 32-bit constant into memory. Line 180 prints the contents of this address in hex. (~ means in hex, ! means the 32 bit value stored at the following address). Line 190 prints the contents of R0 (in hex) after calling the short piece of assembled code.

If you run the program, you will see that the same number is printed twice. We can therefore deduce that the Arm code loads register R0 with a value from memory, and line 130 is where it does the deed. You should notice that the LD instruction has had an R added to it, which instructs the Arm to load a whole register (32 bits). R0 is the destination of the load and, as expected, the source of the load is the label memory. To load just a single byte (eight bits) from an address, add an extra B after the R. Try changing line 130 to: LDRB R0,memory and re-run the program.

The first printed number (from Basic) should give the full 32-bit value stored at memory, whereas the value returned by USR contains only the low eight-bits of the value (&56 in this case). LDRB, or load register with byte, does just that. Note that the rest of the register is cleared to zeros.

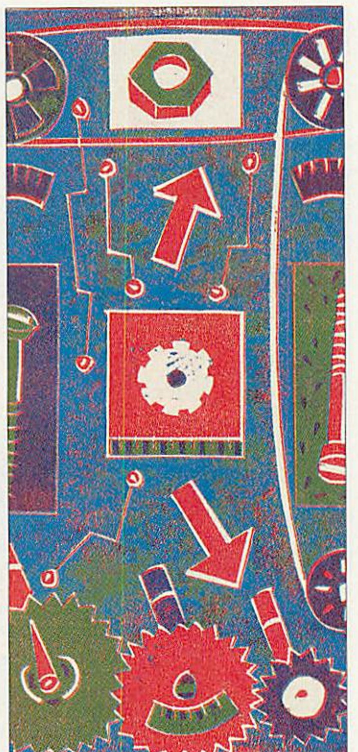
The instructions STR and STRB work in exactly the same way, but transfer data from a register to memory. Program *Arm4* is yet another rather contrived example but shows both LDR and STR in action. The address total holds a running total, the Basic REPEAT loop asks for a score, passes it to the code in R0 (via A%). This loads the current total into R1, adds R0 to it and stores it back in total. The contents of total are displayed within the REPEAT loop.

PC RELATIVE

No, my uncle is not in the police force! PC relative is rather a frightening technical term that describes the sort of memory accessing we have done so far. But notice that we don't seem to have done anything horribly technical – merely supplied a register number and an address. This is because the assembler has taken care of the dirty work for us.

Remember, we are always insisting that Arm instructions take up 32 bits. Well, nothing has changed since moving over to LDR and STR. But, as with numerical constants the problem is how to fit all the data into 32 bits. With data transfer instructions, four bits stand for the condition code, two bits mark the instruction as a data transfer and four bits are needed for the destination register for a load (or source for a store). One bit flags a load or a store and five further bits are needed for a number of extended features which I will explain later. So this only leaves 16 bits to specify the memory address – not very many.

If we encode an address using merely these bits, it would give a range of 0 to &10000, which is barely more than Basic's normal PAGE setting. Instead, we use four bits as a register number and the remaining twelve as an offset. This means that a second register is used to hold the address in memory that we need to access. As an Arm register can hold any 32-bit value, we therefore have an unlimited addressing range available.



Those 12 offset bits work in a similar (but not identical) way to immediate constants. They can either hold a register number and a shift or a value between -4095 and +4095. Take note, this is not an 'Acorn format' eight-bit value and four-bit shift. What use is including an offset, since we can access any address using the first register? Well, it is actually of immense use, especially when those 'other' bits come into play. For now you only need to take note of one particular application.

But first, take a look at *Arm5*. This program is a little naughty as it accesses an address that it shouldn't really! Fear not, though, nothing will go wrong and I need to illustrate a point without complicating the issue even further.

A random number is stored at address &10000, which is then printed out from Basic and via the piece of code. R1 is loaded with the address &10000 (where the random number was stored) at line 130. Line 140 uses R1 indirectly: R0 is loaded from the address contained in R1. This indirection is specified by enclosing the register in square brackets []. R0 is therefore loaded with the value stored at address &10000 – our random number.

It would get rather laborious if we had to use this method each time we wanted a value from memory, but remember that *Arm3* didn't. Hang on one minute and I'll explain. First try changing the following lines in *Arm5*:

```
140 LDR R0,[R1,#4]
185 !&10004=RND(10000)
190 PRINT !&10000,!&10004,
    USR(load)
```

Now two random numbers are stored in consecutive words – which one does the USR(load) print? The one stored at &10004, of course. We are now making use of the offset. Line 140 now reads as 'load R0 from the address four bytes on from the value stored in R1', in other words &10000+4 or &10004 – the second random number.

POSITION INDEPENDENCE

Now back to *Arm3*. Because any Arm register can be used as an operand, why not use R15, the program counter! The PC keeps track of where we are in the machine code, so using this in conjunction with an offset value, we can 'reach' memory within 4K (4*1024=4096) in either direction of the current address. This means that constants are often stored fairly close to the routines that use them and the assembler automatically detects lines such as: LDR R0,memory and actually assembles something along the lines of: LDR R0,[PC,#12]

Since accesses are performed in relation to the program counter, this sort of operation is called PC relative. And this has an important outcome. No memory addresses are 'burnt' into the code (as in *Arm5*). Instead this merely contains an offset from where the access takes place, so the same piece of code will work no matter where it is run in memory. In other words, the code is *position independent* – which is a highly desirable feature.



GAMES UP!

Dave Lawrence presents some classic entertainment for BBC gamesters

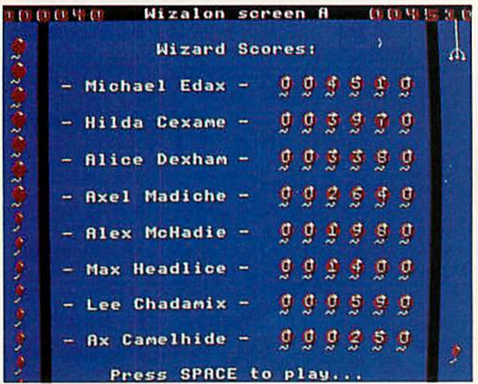
This month in Pieces of Eight, we feature two of the most popular type-in games ever to appear in *BBC Acorn User*. First, we have a special request from our very own techie, Paul James. *Wizalon* is a game of balloons, wizards and a seesaw and was first feaured almost five years ago. Secondly we have *Runemaker: Codename Druid*, probably the best type-in game ever.

Because of the sheer size of these games, it was not possible to print the listings on the yellow pages. Fully working and ready-to-play copies can be found on the monthly subscribers' disc.

WIZALON

Once upon a time, there were two good wizards, Nino Qunty and Brähel Gelm. They lived in the White Castle of Nûr Eracos and did good deeds for the local residents. They controlled the weather, fended off the evil hordes and sometimes even managed to get the barbecue going. One day the evil sorcerer Jefel Droot tricked Nino and Brähel into entering his lair, the Black Citadel. Here he incarcerated them in his foul balloon-filled dungeon.

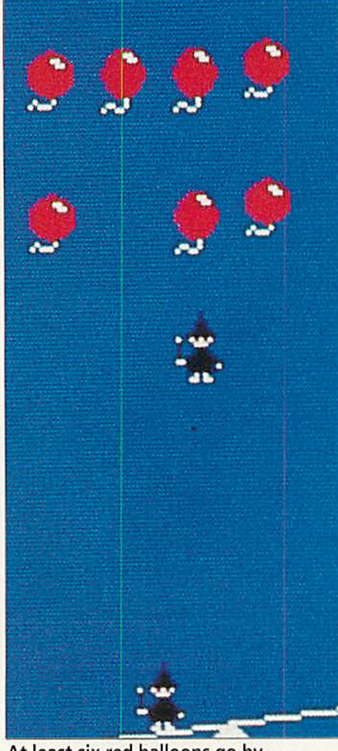
The only possible escape for our heroes lies in bursting these deadly red party accessories. Jefel's evil presence has almost totally cloaked Brähel and Nino's magic and, in a final all-or-nothing attempt at conjuring, they managed to summon Brähel's nephew's magical see-saw. Now it's up to you to try and save the goodies from the baddy!



Top wizards – outstanding!

That's quite enough silly scenarios – in practice, you have control over the see-saw at the bottom of the screen. The Z key moves it left, X moves it right and RETURN flips it round, whereas P pauses and unpauses the game.

In the beginning, one wizard appears on the see-saw, the other in the air. The idea is to keep the wizards bouncing in the air, bursting the balloons. When the airborne wizard lands on the upward end of the see-saw, the other wizard will take off. Landing on different parts of the seesaw gives different effects. To increase bounce height, try to make the incoming wizard land nearer the pivot than the stationary wizard; further away and you lose height.



At least six red balloons go by . . .

Different launch positions can also alter the sideway movements of the two wizards. One particular combination of wizard positions will have a dramatic effect – remember the see-saw is magic! If you miss the see-saw entirely, nothing appalling happens, you just lose some height and the trident on the right descends slightly. The balloon on the right rises with time. When it meets the trident, your game is over. The balloons to the left of the play area are not part of the game, they merely represent Jefel's stockpile.

When in flight, the wizards also bounce off the sides of the screen and the balloons. If they manage to spike the underside of a balloon with their pointy hats, it bursts. Balloons also burst when the wizards land on top of them six times, but this scores fewer points than simply skewering them.

If you manage to burst every balloon, the wizards are whisked away to the next balloon-filled dungeon. You receive a bonus for the amount of time left and, if you're lucky, Nino may summon enough magic to raise the trident a little. The game features a high score table, and if you have accrued enough points at the end of your game, you'll be invited to enter your name among the anagrams of Hexadecimal!

RUNEMAKER

Stepping a little further back in time, thousands of years before the dawn of history, to be precise, we find the setting for our second game. In those early days of mankind, it was a common sight to see Evil Hordes pillaging your village and carrying off your favourite ox.

After many years of this harassment, someone rang Dial-a-Druid, or perhaps it was Spells-R-Us, to see if anything could be done. The druids offered to construct a magical charm from the mystic Seven Runes of Brationst and they asked but a small fee for performing this task (£7.50 was a lot of cash in those days). The Cumentexis of Fire was duly assembled and verily were the hideous hordes banished to whence they came.

All went well until last Tuesday evening when the thing just sort-of-went-critical and exploded, or whatever it is mystic runecharm thingies do. This of course, opens the way for all those nasty hordes again and just think how angry they'll be after all this time – it won't just be your ox

they're after! The only hope is for you to go back in time to the days when the great Cumentexis was constructed and, by using the combined knowledge of all the leading brains of the 20th century and a large tube of Araldite, make a new one!

Here in Time Control Headquarters, you have been equipped with the very latest in flowing cape technology, disguised by a sinister pointy hat (all the rage in man's early existence). You are also armed with a rather natty little druidic spell. The temporal vortex has only just finished doing something quite disgustingly biological to your atoms and already you've materialised in the pre-dawn of time (about 7.30am) on a rather damp and squalid looking Wednesday morning. There are some 'ancient' monuments just over the next rise, it's just started to rain and the future of man is in the balance – better go get dem runes!



Runemaker: mystic runes or a Big Mac – it's your choice . . .

GET IN THERE, MY SON!

You control the druid with Z and X for left and right. The : key jumps and RETURN casts a spell. You can only land on certain surfaces in the game – you should soon be able to find out which ones will support the weight of a druid. Other keys include S and Q for turning the sound on and off and COPY and DELETE to pause and unpause.

The main object of the each round is to collect the seven runes and take them to the altar stone where the Cumentexis is to be constructed. On your quest, you have to neutralise or avoid three sorts of baddie. First are the LEOs (Law Enforcement Officers). They patrol the ground level of each screen. Then there are the ELIs (Extra Large Inchworms), these fall from the sky, often landing on you. Having achieved this feat, they crawl along flat surfaces, but will fall off anything if they can.

Finally, and least predictable, is the GBW or Great British Weather. At the start of the game, the weather is quite calm, but later it may



Come on, Leo Briefcase is rubbish

become stormy, with bolts of lightning unleashed from the clouds.

If you collide with any of these enemies or fall too far, you lose energy. Your current level is indicated by the bar at the top of the screen. If this bar reaches zero, you lose one of your three lives. If you lose all three lives or the candle on the right flickers out, the game is over. Casting a spell costs one unit of energy, but is powerful enough to knock out an ELI or LEO. It's amazing what those bods at T.C.H.Q. can do!

A lightning strike can also dispose of them, but don't forget it can have a nasty effect on you as well. Sadly, those same bods at T.C.H.Q. were not able to give you any protection from the G.B.W. You can regain energy with the magical energy pills that look strangely similar to hamburgers.

Runes and energy pills are dotted randomly about the landscape. Some are quite tricky to reach and collecting them may involve jumping from screen to screen. The arrows below the energy bar point in the direction of the nearest collectable item. If they both point inwards, there is something on the current screen to collect. Points are awarded for collecting runes and ridding the world of LEOs and ELIs. A bonus is awarded for unused time.

Once you have found all seven runes, stand on the middle of the altar stone. Constructing a Cumentexis is not a trivial task, so you'll have to stand there for a while and you may have to avoid an onslaught of ELIs. As you stand on the altar, the runes will begin to flash.

Once the entire charm is pulsating with ethereal light you proceed to the next, more difficult, level. As the game progresses, you'll get more lightning, more enemies, fewer energy pills, less time to complete the level and later, invisible runes that will only show up during lightning flashes. So those directional arrows will come in very handy indeed.

Due to lack of memory, there is only space for one high score name, so you are asked to enter your name as soon as you beat Leo Briefcase's rather pathetic score . . .

HOW TO PLAY

These two classic eight-bit programs are only available on the *BAU* monthly disc. A monthly subscription, which will assure you delivery of the magazine, plus the disc free, costs as little as £22.95. More subscription details are available on page 89.



Program	Page	BBC B B+	B+/ 128	Master 128	Master Compact	Electron	6502SP/ Turbo	ADFS	Econet	Shadow Ram	Archimedes/ A3000/A5000	Monthly disc
Absolute Beginners	59	*	*	*	*	*	*	*	*	*	*	*
Wired for Sound	61							*	*		*	*
*INFO	67											
MakeDat								*	*		*	*
!Runimage								*	*		*	*
Mindread		*	*	*	*	*	*	*	*		*	*
Smooth								*	*		*	*
Wave8		*	*	*	*	*	*	*	*	*		*
Wave32								*	*		*	*
Contrast								*	*		*	*
BandC								*	*		*	*
Waterwheel								*	*		*	*
GCOL8		*	*	*	*	*	*	*	*	*	*	*
GCOL32								*	*		*	*
CDWords		*	*	*	*		*			*		*
Challenge		*	*	*	*	*	*	*	*	*	*	*
Follow		*	*	*	*	*	*	*	*	*	*	*
Arm Programming	75								*		*	*

Typing in listings from the yellow pages.

The yellow pages are subdivided into article headings. Each article heading corresponds with its article in the magazine.

So for instance to find listing three of *INFO in the yellow pages (MindRead) look for the *INFO heading, then follow the listings through until you get to listing three.

At the beginning of the program are a few lines that tell you what machines it works on. This information can also be derived from the table above.

For Archimedes owners it may not be immediately obvious how to actually type in the listings. By pressing Function key 12 you can access the command line. From here type BASIC and the Archimedes will enter the Basic language. You may like to type MODE 12, which will turn the screen to white on black.

Then simply copy each line of the program in turn after the '>' prompt, pressing RETURN when finished. Save the program onto disc by typing SAVE"<filename>". It can then be run by typing RUN. You will probably need to debug it as you may have made some typing errors.

When you have finished debugging save the program one last time. Then it can either be double-clicked upon from the desktop, or loaded using LOAD"<filename>".

A more detailed description of how to type in listings from the yellow pages appear in BBC Acorn User, August 1992.

Absolute Beginners

Listing 1 - Bomber

```
   10 REM Bomber
   20 REM by Paul James
   30 REM for all machines
   40 REM (c) BAU Sep 1992
   50 :
   60 MODE 1
   70 VDU 19,0,6;0;
   80 VDU 19,3,0;0;
   90 PROCsetup
  100 PROCdrawbuildings
  110 :
  120 FOR down%=1 TO 22
  130 FOR across%=0 TO 35
  140 PROCprintplaneandbomb
  150 PROCdelay(10)
  160 key%=FALSE
  170 IF bombgoing%=FALSE THEN key%=FNsp
ace
  180 IF key%=TRUE THEN bombgoing%=TRUE:
bombx%=across%+1:bomby%=down%
  190 IF bombgoing%=TRUE THEN PROCbomb
  200 IF 23-height%(across%+3)=down% THE
N PROChitbuilding
  210 PROCrubplaneandbomb
  220 NEXT across%
  230 NEXT down%
  240 CLS
  250 PRINT "A SAFE LANDING!"
  260 END
  270 :
  280 DEF PROCbomb
  290 IF bomby%<23 THEN bomby%=bomby%+1
  300 SOUND 1,-1,100-bomby%,2
  310 height%(bombx%)=0
  320 IF bomby%=23 THEN bombgoing%=FALSE
:PRINTTAB(bombx%,bomby%-1);" "
  330 ENDPROC
  340 :
  350 DEF PROCprintplaneandbomb
  360 COLOUR 3
  370 PRINT TAB(across%,down%);CHR$ 226;
CHR$ 227;CHR$ 228;
  380 IF bombgoing%=TRUE THEN PRINTTAB(b
ombx%,bomby%);CHR$ 224
  390 ENDPROC
  400 :
  410 DEF PROCrubplaneandbomb
  420 PRINT TAB(across%-1,down%);"    ";
  430 IF bombgoing%=TRUE THEN PRINTTAB(b
ombx%,bomby%-1);" "
  440 ENDPROC
  450 :
  460 DEF PROChitbuilding
  470 SOUND 0,-15,100,10
  480 PRINT TAB(0,0)"You are dead!"
  490 END
  500 :
  510 DEF PROCsetup
  520 CLS
  530 VDU 23;8202;0;0;0;
  540 VDU 23,224,126,60,126,122,253,253,
251,126       :REM Bomb
  550 VDU 23,225,255,129,129,129,129,255
,255,255      :REM Window
  560 VDU 23,226,192,224,240,31,255,255,
127,0         :REM Plane Tail
  570 VDU 23,227,0,3,63,255,240,0,255,0
              :REM Plane Middle
  580 VDU 23,228,240,204,242,255,63,126,
248,0         :REM Plane Nose
  590 DIM height%(40)
  600 bombgoing%=FALSE
  610 ENDPROC
  620 :
  630 DEF PROCdrawbuildings
  640 COLOUR 1
  650 FOR x%=4 TO 35
  660 FOR y%=0 TO RND(RND(15))
  670 PRINT TAB(x%,22-y%);CHR$ 225
  680 NEXT y%
  690 height%(x%)=y%
  700 NEXT x%
  710 ENDPROC
  720 :
  730 DEF PROCdelay(delay%)
  740 now%=TIME
  750 REPEAT UNTIL TIME-now%>delay%
  760 ENDPROC
  770 :
  780 DEF FNspace
  790 IF INKEY(-99)=TRUE THEN =TRUE ELSE
=FALSE
```

Wired for Sound

Listing 1 - StereoDemo

```
   10 REM > StereoDemo (Sound1)
   20 REM by David Radford
   30 REM for Arc only
   40 REM (c) BAU September 1992
   50 :
   60 *VOICES
   70 INPUT'"Enter name: "n$
   80 VOICES 2
   90 VOICE 1,n$
  100 VOICE 2,n$
  110 range%=70
  120 speed%=5
  130 :
  140 PRINT"Using STEREO command:"
  150 G=GET
  160 stereo%=-range%:stereoinc%=speed%
  170 STEREO 1,stereo%
  180 SOUND 1,-10,100,255
  190 TIME=0
  200 REPEAT
  210 IF stereo%+stereoinc%>range% OR st
ereo%+stereoinc%<-range% THEN stereoinc%
=-stereoinc%
  220 stereo%+=stereoinc%
  230 STEREO 1,stereo%:WAIT
  240 UNTIL TIME>300
  250 SOUND 1,0,100,0
  260 :
  270 PRINT"Using custom stereo position
s:"
  280 G=GET
  290 stereo%=-range%:stereoinc%=speed%
  300 STEREO 1,-127
  310 STEREO 2,127
  320 PROCinitstereo
  330 BEATS4:TEMPO &800
  340 SOUND 1,-15,100,255,1
  350 SOUND 2,-15,100,255,-1
  360 TIME=0
  370 REPEAT
  380 IF stereo%+stereoinc%>range% OR st
ereo%+stereoinc%<-range% THEN stereoinc%
=-stereoinc%
  390 stereo%+=stereoinc%
  400 PROCfakestereo(1,2,100,stereo%)
  410 WAIT
  420 UNTIL TIME>300
  430 SOUND 1,0,100,0
  440 SOUND 2,0,100,0
  450 END
  460 :
  470 DEF PROCfakestereo(chl%,chr%,p%,s%
)
  480 LOCAL a%,b%,d%
  490 a%=s%+127
  500 b%=stereotable%?(255-a%)
  510 a%=stereotable%?a%
  520 SYS "Sound_ReadControlBlock",chl%,
12 TO,,d%
  530 SOUND chl%,&180+a%,p%,d%/5
  540 SOUND chr%,&180+b%,p%,d%/5
  550 ENDPROC
  560 :
  570 DEF PROCinitstereo
  580 LOCAL a%,b%,c%,d%
  590 DIM stereotable% 255
  600 SYS "Sound_Volume",127 TO a%
  610 FOR b%=0 TO 255
  620 SYS "Sound_SoundLog",(127-INT(b%/2
+0.5)) << 24 TO c%
  630 stereotable%?b%=c% >> 1
  640 NEXT
  650 SYS "Sound_Volume",a%
  660 ENDPROC
```

Listing 2 - StereoEcho

```
   10 REM > StereoEcho (Sound2)
   20 REM by David Radford
   30 REM for Arc only
   40 REM (c) BAU September 1992
   50 :
   60 PROCassem
   70 :
   80 INPUT"Enter filename of source fil
e: "f$
   90 SYS "OS_File",5,f$ TO a%,,,,!filel
ength
  100 IF a%=0 THEN PRINT"File not found"
:END
  110 IF a%=2 THEN PRINT"That's a direct
ory!":END
  120 :
  130 INPUT"Enter destination filename:
"d$
```




```
140 d1$=d$+"L":d2$=d$+"R"
150 :
160 PRINT'"Now enter the values that define the echo."
170 PRINT"For any 'right channel' value, you may press RETURN"
180 PRINT"to make it the same as the left channel."
190 :
200 PROCinput("Delay buffer size (in kilobytes)",delay1,delay2,FALSE)
210 DIM tempbuff1% delay1*4*1024
220 DIM tempbuff2% delay2*4*1024
230 FOR T%=0 TO delay1*4*1024-4 STEP 4:tempbuff1%!T%=0:NEXT
240 FOR T%=0 TO delay2*4*1024-4 STEP 4:tempbuff2%!T%=0:NEXT
250 PROCinput("Percentage of echo in output",!outmix1,!outmix2,TRUE)
260 PROCinput("Percentage of output fed back",!feedback1,!feedback2,TRUE)
270 PROCinput("Percentage of feedback is from other channel",!crossedover1,!crossedover2,TRUE)
280 :
290 infile%=OPENIN(f$)
300 outfile1%=OPENOUT(d1$)
310 outfile2%=OPENOUT(d2$)
320 REM copy sample period
330 a%=BGET#infile%
340 BPUT #outfile1%,a%
350 BPUT #outfile2%,a%
360 REM set up machine code
370 !infilehandle=infile%
380 !outfile1handle=outfile1%
390 !outfile2handle=outfile2%
400 !delaybuffer1=tempbuff1%
410 !delaybuffer2=tempbuff2%
420 !delay1len=delay1*4*1024-4
430 !delay2len=delay2*4*1024-4
440 REM process echo
450 CALLecho
460 CLOSE#infile%
470 CLOSE#outfile1%
480 CLOSE#outfile2%
490 END
500 :
510 DEF PROCinput(a$,RETURN a,RETURN b,f%)
520 PRINT'"LEFT - ";a$;:INPUT ": "a
530 PRINT"RIGHT - ";a$;:INPUT ": "a$
540 IF a$="" THEN b=a ELSE b=VAL(a$)
550 IF f% THEN
560 a=a/100*128:b=b/100*128
570 ENDIF
580 ENDPROC
590 :
600 DEF FNr(i%):P%+=i%:=""
610 :
620 DEF PROCassem
630 DIM code% 8192
640 FOR PASS=0 TO 2 STEP 2
650 P%=code%
660 [OPT PASS
670 :
680 .echo
690 STMFD R13!,{R14}
700 LDR R8,delay1len
710 LDR R9,delay2len
720 MOV R10,#0
730 LDR R11,filelength
740 BL readbuffer
750 .echoloop
760 ADR R0,inbuff
770 LDRB R0,[R0,R10]
780 \ convert to 32 bit signed
790 MOV R0,R0,LSL #24
800 MOV R0,R0,ASR #24
810 \ do processing
820 FNprepareoutput(delaybuffer1,outmix1,6,8)
830 FNprepareoutput(delaybuffer2,outmix2,7,9)
840 FNcrossover(4,crossedover1,6,7)
850 FNcrossover(5,crossedover2,7,6)
860 FNfeedback(4,feedback1,delaybuffer1,8)
870 FNfeedback(5,feedback2,delaybuffer2,9)
880 SUBS R8,R8,#4
890 LDRMI R8,delay1len
900 SUBS R9,R9,#4
910 LDRMI R9,delay2len
920 .write
930 ADD R0,PC,#((outbuff1-P%-8)AND&00FF)
940 ADD R0,R0,#((outbuff1-P%-8)AND&FF00)
950 STRB R6,[R0,R10]!
960 STRB R7,[R0,#-1024]
970 ADD R10,R10,#1
980 CMP R10,#1024
990 BLT dontwrite
1000 MOV R10,#0
1010 MOV R3,#1024
1020 BL writebuffers
1030 BL readbuffer
1040 .dontwrite
1050 SUBS R11,R11,#1
1060 BNE echoloop
1070 MOVS R3,R10
1080 BLNE writebuffers
1090 LDMFD R13!,{PC}
1100 :
1110 .filelength EQUD 0
1120 .delaybuffer1 EQUD 0
1130 .delaybuffer2 EQUD 0
1140 .delay1len EQUD 0
1150 .delay2len EQUD 0
1160 .outmix1 EQUD 0
1170 .outmix2 EQUD 0
1180 .feedback1 EQUD 0
1190 .feedback2 EQUD 0
1200 .crossedover1 EQUD 0
1210 .crossedover2 EQUD 0
1220 :
1230 .readbuffer
1240 MOV R0,#4
1250 LDR R1,infilehandle
1260 ADR R2,inbuff
1270 CMP R11,#1024
1280 MOVLT R3,R11
1290 MOVGE R3,#1024
1300 SWI "OS_GBPB"
1310 MOV PC,R14
1320 :
1330 .inbuff FNr(1024)
1340 :
1350 .writebuffers
1360 MOV R0,#2
1370 LDR R1,outfile1handle
1380 LDR R2,outfile2handle
1390 STMFD R13!,{R0,R2,R3}
1400 ADR R2,outbuff1
1410 SWI "OS_GBPB"
1420 LDMFD R13!,{R0,R1,R3}
1430 ADR R2,outbuff2
1440 SWI "OS_GBPB"
1450 MOV PC,R14
1460 :
1470 .outbuff2 FNr(1024)
1480 .outbuff1 FNr(1024)
1490 :
1500 .infilehandle EQUD 0
1510 .outfile1handle EQUD 0
1520 .outfile2handle EQUD 0
1530 ]NEXT
1540 ENDPROC
1550 :
1560 DEF FNprepareoutput(dp%,op%,dr%,do%)
1570 [OPT PASS
1580 \ r0 = source data
1590 LDR R1,dp%:\ pointer to delay buffer
1600 LDR R2,op%:\ fraction of echo in output
1610 RSB R3,R2,#128
1620 MUL R4,R0,R3:\ scaled amount of source * 128
1630 LDR R3,[R1,do%]
1640 MLA dr%,R3,R2,R4
1650 MOV dr%,dr%,ASR #7
1660 ]:=""
1670 :
1680 DEF FNcrossover(dest%,mixptr%,thischan%,oppchan%)
1690 [OPT PASS
1700 LDR R0,mixptr%
1710 RSB R1,R0,#128
1720 MUL R2,thischan%,R1
1730 MLA dest%,oppchan%,R0,R2
1740 ]:=""
1750 :
1760 DEF FNfeedback(feedback%,fbptr%,delptr%,deloff%)
1770 [OPT PASS
1780 LDR R0,fbptr%
1790 MUL feedback%,R0,feedback%
1800 MOV feedback%,feedback%,ASR #7
1810 LDR R1,delptr%
1820 LDR R2,[R1,deloff%]
1830 RSB R0,R0,#128
1840 MLA R2,R0,R2,feedback%
1850 MOV R2,R2,ASR #7
1860 STR R2,[R1,deloff%]
1870 ]:=""
```

*INFO

Listing 1 - MakeDat

```
10 REM >MakeDat (Info1)
20 REM !Run, Menu and !Sprite files
30 REM Application by Steve Douglas
40 REM for 32-bit machines
50 REM (c) BAU September 1992
60 :
70 free%=(HIMEM-END-&8000) AND &FFFFF000
80 DIM w% free%
90 REPEAT
100 READ file$
110 IF file$<>"*" THEN
120 READ type%
130 PRINT"Creating file """file$""" (type &";~type%;")"
140 IF type%=&FFF OR type%=&FEB THEN
150 out%=OPENOUT(file$)
160 REPEAT
170 READ line$
180 IF line$<>"*" BPUT#out%,line$
190 UNTIL line$="*"
200 CLOSE#out%
210 ELSE
220 READ olen%
230 p%=0
240 d$=""
250 dl%=1
260 WHILE p%<olen%
270 b%=FNb
280 IF b%=130:p%?w%=FNb:p%+=1
290 IF b%>=131 AND b%<=162 THEN
300 n%=b%-128
310 f%=p%-FNb
320 FOR i%=0 TO n%-1
330 ?(w%+p%+i%)=?(w%+f%+i%)
340 NEXT
350 p%+=n%
360 ENDIF
370 IF b%<130 OR b%>162 THEN p%?w%=b%:p%+=1
380 ENDWHILE
390 SYS "OS_File",0,file$,,,w%,w%+p%
400 ENDIF
410 SYS "OS_File",18,file$,type%
420 ENDIF
430 UNTIL file$="*"
440 PRINT'"All files created okay"
450 END
460 :
470 DEF FNb
480 LOCAL b%,c1%,c2%,i%
490 IF d$="" THEN
500 READ d$,c1%
510 c2%=0
520 FOR i%=1 TO LEN(d$)/2
530 c2%+=EVAL("&"+MID$(d$,2*i%-1,2))
540 NEXT
550 IF c1%<>(c2% MOD 100) PRINT"Error in DATA line ";dl%:END
560 dl%+=1
570 ENDIF
580 b%=EVAL("&"+LEFT$(d$,2))
590 d$=MID$(d$,3)
600 =b%
610 :
620 DATA "!Run",&FEB
630 DATA "| !SciCalc"
640 DATA "Set SciCalc$Dir <Obey$DIR>"
650 DATA "WimpSlot -min 32k -max 32k"
660 DATA "Run <Obey$Dir>.!RunImage"
670 DATA *
680 DATA "Menu07",&FFF
690 DATA "59","29","","","58","29",""
700 DATA "","57","29","","","56","29"
710 DATA "","","55","29","","","49"
720 DATA "29","","","48","29","",""
730 DATA "47","29","","","46","29",""
740 DATA "","45","29","","","39","29"
750 DATA "","","38","29","","","37"
760 DATA "29","","","36","29","",""
770 DATA "35","29","","","29","29",""
780 DATA "","28","29","","","27","29"
790 DATA "","","26","29","","","25"
800 DATA "29","","","19","29","CONV",""
810 DATA "18","29","","","17","29",""
820 DATA "","16","29","PROG","","15"
830 DATA "29","MATH",""
840 DATA *
850 DATA "Menu15",&FFF
860 DATA "59","-1","PI","PI","58","-1"
870 DATA "e","2.718281828","57","-1",""
880 DATA "","56","-1","","","55","-2"
890 DATA "1/x","1/x","49","-2","x^2"
900 DATA "x*x","48","-3","y^x","t^x"
910 DATA "47","-1","","","46","-2"
920 DATA "|x|","ABS(x)","45","-2","x!"
930 DATA "FNfact(x)","39","-2","SQRT"
940 DATA "SQR(x)","38","-3","xRTy"
950 DATA "10^(LOG(t)/x)","37","-1",""
960 DATA "","36","-1","","","35","-1"
970 DATA "","","29","-2","e^x"
980 DATA "2.718281828^x","28","-2"
990 DATA "10^x","10^x","27","-2","ATN"
1000 DATA "FNcvfr(ATN(x))","26","-2"
1010 DATA "ACS","FNcvfr(ACS(x))","25"
1020 DATA "-2","ASN","FNcvfr(ASN(x))"
1030 DATA "19","-2","LN","LN(x)","18"
1040 DATA "-2","LOG","LOG(x)","17","-2"
1050 DATA "TAN","TAN(FNcvtr(x))","16"
1060 DATA "-2","COS","COS(FNcvtr(x))"
1070 DATA "15","-2","SIN"
1080 DATA "SIN(FNcvtr(x))"
1090 DATA *
1100 DATA "Menu16",&FFF
1110 DATA "59","-1","","","58","-3"
1120 DATA "DIV","t DIV x","57","-3"
1130 DATA "CBIT","t AND NOT(1<<x)","56"
1140 DATA "-2","INT","INT(x)","55","-2"
1150 DATA "BIT","1<<x","49","-1","",""
1160 DATA "48","-3","MOD","t MOD x","47"
1170 DATA "-3","SBIT","t OR 1<<x","46"
1180 DATA "-1","","","45","-1","NOT"
1190 DATA "NOT x","39","-1","&FFFF"
1200 DATA "&FFFF","38","-3","EOR"
1210 DATA "t EOR x","37","-3","SRA"
1220 DATA "t>>x","36","15","F","","35"
1230 DATA "14","E","","29","-1","&FF"
1240 DATA "&FF","28","-3","OR","t OR x"
1250 DATA "27","-3","SRL","t>>>x","26"
1260 DATA "13","D","","25","12","C",""
1270 DATA "19","-1","&F","&F","18","-3"
1280 DATA "AND","t AND x","17","-3"
1290 DATA "SLL","t<<x","16","11","B",""
1300 DATA "15","10","A",""
1310 DATA *
1320 DATA "Menu19",&FFF
1330 DATA "59","-1","","","58","-1",""
1340 DATA "","57","-1","","","56","-1"
1350 DATA "","","55","-1","","","49"
1360 DATA "-2","kP-ps","x/6.89","48"
1370 DATA "-2","kJ-Bt","x/1.06","47"
1380 DATA "-2","N-lbf","x/4.45","46"
1390 DATA "-2","kw-hp","x/0.746","45"
1400 DATA "-2","C-F","9/5*x+32","39"
1410 DATA "-2","ps-kP","x*6.89","38"
1420 DATA "-2","Bt-kJ","x*1.06","37"
1430 DATA "-2","lbf-N","x*4.45","36"
1440 DATA "-2","hp-kw","x*0.746","35"
1450 DATA "-2","F-C","5/9*(x-32)","29"
1460 DATA "-2","l-gal","x/4.55","28"
1470 DATA "-2","kg-lb","x/0.454","27"
1480 DATA "-2","g-oz","x/28.3","26","-2"
1490 DATA "km-M","x/1.61","25","-2"
1500 DATA "cm-in","x/2.54","19","-2"
1510 DATA "gal-l","x*4.55","18","-2"
1520 DATA "lb-kg","x*0.454","17","-2"
1530 DATA "oz-g","x*28.3","16","-2"
1540 DATA "M-km","x*1.61","15","-2"
1550 DATA "in-cm","x*2.54"
1560 DATA *
1570 DATA "!Sprites",&FF9
1580 DATA &2D8
1590 DATA 01000000108304DC020000,74
1600 DATA CC83042173636963616C63,94
1610 DATA 83170003871C840C178328,58
1620 DATA AC832CBC83310C8434F0F0,91
1630 DATA F08304F010D0D0D08304D0,98
1640 DATA 10B0B0B08304B010829082,75
1650 DATA 908290830482901070707070,79
1660 DATA 830470105050505083045010,34
1670 DATA 303030830430846C847010,27
1680 DATA 0040829083048290100E0E0,11
1690 DATA 0083048384C083888304D0,0
1700 DATA 839083048318B0831CB010,92
1710 DATA 5080008304837080837483,40
1720 DATA 0400B0F08304F0BBBBBBBB,43
1730 DATA 83048607BBBB008F108F10,68
1740 DATA 9A203233BB338C404B6733,58
1750 DATA B38D5073678E603376B586,40
1760 DATA 70424554832A42B35257B2,96
1770 DATA 84805B771251852B879074,40
1780 DATA 67336377844B87A0756783,25
1790 DATA 278BB0727725BB3B8CC074,18
1800 DATA 776725A2D098F000000083,52
1810 DATA 048607830DFF8F118F109A,17
1820 DATA 20FFFF853C8940F0FFFF0F,1
1830 DATA 8D5083218F108720FF852A,41
1840 DATA FF0F86078439862B879084,88
1850 DATA 0F854B8910890D882000F0,34
1860 DATA 8CC08F40A2E08CF3FF,63
1870 DATA *
```

Listing 2 - !RunImage

```
10 REM >!RunImage (Info2)
20 REM Scientific calculator
30 REM by Steve Douglas
40 REM for 32-bit machines
50 REM (c) BAU September 1992
60 :
70 PROCinit
80 PROCwimp_init
90 PROCcreate_sys_keys
100 PROCcreate_user_keys
110 PROCcreate_display
120 PROCput_display
130 cb%!0=windhandle%
140 SYS "Wimp_OpenWindow",0,cb%
150 DIM mb% 256
160 ON ERROR PROCerr
170 REPEAT
180 SYS "Wimp_Poll",&1831,mb% TO code%,msg%
190 CASE code% OF
200 WHEN 2:SYS "Wimp_OpenWindow",0,msg%
210 WHEN 6:PROCclick(msg%!16,msg%!8)
220 WHEN 8:PROCkey_push(msg%!24)
230 WHEN 17,18:IF msg%!16=0 SYS "Wimp_CloseDown",taskhandle%,&4B534154
240 ENDCASE
250 UNTIL code%=3
260 SYS "Wimp_CloseWindow",0,msg%
270 SYS "Wimp_DeleteWindow",0,msg%
280 SYS "Wimp_CloseDown",taskhandle%,&4B534154
290 END
300 :
310 DEF PROCerr
320 IF errlock%=TRUE ENDPROC
330 errlock%=TRUE
340 errtxt$=REPORT$
350 errnum%=ERR
360 IF LEN(errtxt$)>20 THEN
370 IF errnum%=6  THEN errtxt$="Type mismatch"
380 IF errnum%=20 THEN errtxt$="Number too big"
390 IF errnum%=23 THEN errtxt$="Accuracy lost"
400 errtxt$=LEFT$(errtxt$,20)
410 ENDIF
420 PROCput_display
430 PROCredraw_display
440 ENDPROC
450 :
460 DEF PROCinit
470 cancel%=TRUE
480 degrees%=TRUE:hexint%=FALSE
490 sx%=250:sy%=300
500 kcw%=16:kw%=84:kh%=44:kgap%=4
510 ktw%=kw%+kgap%:kth%=kh%+kgap%
520 kcol%=10:krow%=6
```

```
530 klast%=kcol%*krow%-1
540 border%=8
550 ww%=border%*2+(kw%+kgap%)*kcol%-kgap%
560 wh%=border%*2+(kh%+kgap%)*krow%-kgap%
570 prefix$="<SciCalc$Dir>.Menu"
580 cmems%=15:ccler%=11
590 ccons%=3:ckeyp%=3
600 cmono%=8:cdyad%=13
610 cmaps%=14
620 DIM icb% 36,ih%(6),wsb% 36,caret% 24
630 DIM fleg% klast%*6+6,fbut%(klast%)
640 DIM ftok%(klast%),fexp$(klast%)
650 DIM khandle%(klast%)
660 FOR i%=0 TO klast%
670 khandle%(i%)=-1
680 NEXT
690 DIM display% 20,radann% 4,memann% 4
700 DIM brkann% 4,errann% 4
710 DIM legtxt% 8,partxt% 3,parval% 9,exptxt% 2,newleg% 8
720 $legtxt%="Legend"
730 $partxt%="p="
740 $parval%="A0-2/A-F"
750 $exptxt%="="
760 DIM par% 2,exp% 33
770 DIM stackop$(9),stackt(9)
780 panel%=-1
790 disp%=0
800 PROCinit_sys_keys
810 PROCinit_user_keys(15)
820 nop$="x"
830 PROCclr
840 m=0
850 ENDPROC
860 :
870 DEF PROCwimp_init
880 SYS "Wimp_Initialise",200,&4B534154,"SciCalc" TO vers%,taskhandle%
890 DIM cb% 100
900 wcb%=cb%+4
910 wcb%!0=sx%:wcb%!4=sy%
920 wcb%!8=sx%+ww%-1:wcb%!12=sy%+wh%-1
930 wcb%!16=0:wcb%!20=0:wcb%!24=-1
940 wcb%!28=&87001052
950 wcb%?32=7:wcb%?33=2:wcb%?34=7:wcb%?35=5
960 wcb%?36=3:wcb%?37=1:wcb%?38=12:wcb%?39=0
970 wcb%!40=0:wcb%!44=-wh%:wcb%!48=ww%:wcb%!52=0
980 wcb%!56=%111101
990 wcb%!60=&0000B000
1000 wcb%!64=1:wcb%!68=0
1010 $(wcb%+72)="SciCalc"+CHR$0
1020 wcb%!84=0
1030 SYS "Wimp_CreateWindow",0,wcb% TO windhandle%
1040 ENDPROC
1050 :
1060 DEF PROCclick(icon%,buttons%)
1070 LOCAL i%,k%,tok%
1080 IF icon%<0 ENDPROC
1090 IF icon%=ih%(0) SYS "Wimp_SetCaretPosition",windhandle%,-1,,,1<<25:ENDPROC
1100 k%=-1
1110 i%=0
1120 REPEAT
1130 IF khandle%(i%)=icon% k%=i%
1140 i%+=1
1150 UNTIL i%>klast% OR k%>-1
1160 IF k%<0 ENDPROC
1170 tok%=ftok%(k%)
1180 IF errlock% AND tok%<>23 ENDPROC
1190 IF panel%>-1 AND tok%<>23 AND tok%<>17 ENDPROC
1200 cancel%=tok%=23
1210 IF buttons%=1 THEN
1220 IF (k% MOD kcol%)>4 AND (k% DIV kcol%)>0 THEN
1230 PROCcreate_panel(k%)
1240 PROCredraw_display
1250 ELSE
1260 PROCcreate_display
1270 ENDIF
1280 ELSE
1290 PROCcreate_display
1300 IF tok%<0 AND fexp$(k%)="" ENDPROC
1310 IF buttons%=4 THEN
1320 IF tok%=28 OR tok%=29 THEN
1330 PROCmenu(k%)
1340 ELSE
1350 PROCdo_key(k%)
1360 PROCput_display
1370 PROCredraw_display
1380 ENDIF
1390 ENDIF
1400 ENDIF
1410 ENDPROC
1420 :
1430 DEF PROCkey_push(keycode%)
1440 LOCAL k%
1450 k%=-1
1460 wsb%!0=windhandle%
1470 SYS "Wimp_GetWindowState",,wsb%
1480 IF (wsb%!32 AND &000120000)<>0 AND panel%=-1 THEN
1490 CASE keycode% OF
1500 WHEN ASC("#"):k%=6
1510 WHEN ASC("("):k%=4
1520 WHEN ASC("["):k%=4
1530 WHEN ASC(")"):k%=5
1540 WHEN ASC("]"):k%=5
1550 WHEN ASC("/"):k%=23
1560 WHEN ASC("*"):k%=33
1570 WHEN ASC("-"):k%=43
1580 WHEN ASC("+"):k%=53
1590 WHEN ASC("."):k%=52
1600 WHEN ASC("0"):k%=50
1610 WHEN ASC("1"):k%=40
1620 WHEN ASC("2"):k%=41
1630 WHEN ASC("3"):k%=42
1640 WHEN ASC("4"):k%=30
1650 WHEN ASC("5"):k%=31
1660 WHEN ASC("6"):k%=32
1670 WHEN ASC("7"):k%=20
1680 WHEN ASC("8"):k%=21
1690 WHEN ASC("9"):k%=22
1700 WHEN ASC("="):k%=54
1710 WHEN 13:k%=54
1720 WHEN ASC("\"):k%=51
1730 WHEN 30:k%=9
1740 WHEN 399:k%=34
1750 WHEN 398:k%=44
1760 WHEN 395:k%=24
1770 WHEN 127:k%=14
1780 OTHERWISE k%=-1
1790 ENDCASE
1800 ENDIF
1810 IF k%<0 THEN
1820 SYS "Wimp_ProcessKey",keycode%
1830 ELSE
1840 PROCdo_key(k%)
1850 PROCput_display
1860 PROCredraw_display
1870 ENDIF
1880 ENDPROC
1890 :
1900 DEF PROCmenu(k%)
1910 LOCAL i%
1920 IF fleg%?(k%*6)=0 OR fleg%?(k%*6)=13 ENDPROC
1930 PROCinit_user_keys(k%)
1940 PROCput_user_keys
1950 ENDPROC
1960 :
1970 DEF PROCsave_user_keys(k%)
1980 LOCAL r%,i%,g%
1990 name$=prefix$+CHR$(48+(k% DIV 10))+CHR$(48+(k% MOD 10))
2000 fn%=OPENOUT(name$)
2010 FOR r%=50 TO 10 STEP -10
2020 FOR i%=r%+9 TO r%+5 STEP -1
2030 BPUT#fn%,STR$(i%)
2040 BPUT#fn%,STR$(ftok%(i%))
2050 g%=fleg%+i%*6:s$=""
2060 WHILE ?g%<>0 AND ?g%<>13
2070 s$+=CHR$(?g%)
2080 g%+=1
2090 ENDWHILE
2100 BPUT#fn%,s$
2110 BPUT#fn%,fexp$(i%)
2120 NEXT
2130 NEXT
2140 CLOSE#fn%
2150 ENDPROC
2160 :
2170 DEF PROCinit_user_keys(k%)
2180 LOCAL r%,i%,tok%,c%
2190 IF k%=7 THEN
2200 tok%=29
2210 but%=&E000313D
2220 ELSE
2230 tok%=-1
2240 but%=ckeyp%<<28 OR &313D
2250 ENDIF
2260 FOR r%=50 TO 10 STEP -10
2270 FOR i%=r%+9 TO r%+5 STEP -1
2280 ftok%(i%)=tok%
2290 fleg%?(i%*6)=0
2300 fexp$(i%)=""
2310 fbut%(i%)=but%
2320 NEXT
2330 NEXT
2340 keypad%=k%
2350 name$=prefix$+CHR$(48+(k% DIV 10))+CHR$(48+(k% MOD 10))
2360 fn%=OPENIN(name$)
2370 IF fn%=0 ENDPROC
2380 WHILE EOF#fn%=FALSE
2390 s$=GET$#fn%
2400 IF EOF#fn%=FALSE THEN
2410 i%=VAL(s$)
2420 s$=GET$#fn%
2430 ftok%(i%)=VAL(s$)
2440 $(fleg%+i%*6)=GET$#fn%
2450 fexp$(i%)=GET$#fn%
2460 c%=ckeyp%
2470 IF ftok%(i%)=-3 c%=cdyad%
2480 IF ftok%(i%)=-2 c%=cmono%
2490 IF ftok%(i%)=-1 c%=ccons%
2500 IF ftok%(i%)=29 c%=cmaps%
2510 fbut%(i%)=c%<<28 OR &313D
2520 ENDIF
2530 ENDWHILE
2540 CLOSE#fn%
2550 ENDPROC
2560 :
2570 DEF PROCinit_sys_keys
2580 PROCinit_key(4,18,ckeyp%,"(","")
2590 PROCinit_key(5,19,ckeyp%,")","")
2600 PROCinit_key(6,27,ckeyp%,"HEX","")
2610 PROCinit_key(7,28,cmaps%,"MENU","Keypad Menu")
2620 PROCinit_key(8,24,ckeyp%,"D/R","")
2630 PROCinit_key(9,23,ccler%,"CLR","")
2640 PROCinit_key(14,25,cmems%,"CM","")
2650 PROCinit_key(20,7,ckeyp%,"7","")
2660 PROCinit_key(21,8,ckeyp%,"8","")
2670 PROCinit_key(22,9,ckeyp%,"9","")
2680 PROCinit_key(23,-3,cdyad%,"/","t/x")
2690 PROCinit_key(24,21,cmems%,"SM","")
2700 PROCinit_key(30,4,ckeyp%,"4","")
2710 PROCinit_key(31,5,ckeyp%,"5","")
2720 PROCinit_key(32,6,ckeyp%,"6","")
2730 PROCinit_key(33,-3,cdyad%,"*","t*x")
2740 PROCinit_key(34,22,cmems%,"RM","")
2750 PROCinit_key(40,1,ckeyp%,"1","")
2760 PROCinit_key(41,2,ckeyp%,"2","")
2770 PROCinit_key(42,3,ckeyp%,"3","")
2780 PROCinit_key(43,-3,cdyad%,"-","t-x")
2790 PROCinit_key(44,20,cmems%,"M+","")
2800 PROCinit_key(50,0,ckeyp%,"0","")
2810 PROCinit_key(51,26,ckeyp%,"+/-","")
2820 PROCinit_key(52,16,ckeyp%,".","")
2830 PROCinit_key(53,-3,cdyad%,"+","t+x")
2840 PROCinit_key(54,17,ckeyp%,"=","")
2850 ENDPROC
2860 :
2870 DEF PROCinit_key(k%,tok%,clr%,leg$,exp$)
2880 ftok%(k%)=tok%
2890 $(fleg%+k%*6)=leg$+CHR$(0)
2900 fexp$(k%)=exp$
2910 fbut%(k%)=&313D OR (clr%<<28)
2920 ENDPROC
2930 :
2940 DEF PROCcreate_user_keys
2950 LOCAL r%,i%
2960 FOR r%=10 TO 50 STEP 10
2970 FOR i%=r%+5 TO r%+9
2980 PROCcreate_key(i%)
2990 NEXT
3000 NEXT
3010 ENDPROC
3020 :
3030 DEF PROCcreate_sys_keys
3040 LOCAL r%,i%
3050 FOR i%=4 TO 9
3060 PROCcreate_key(i%)
3070 NEXT
3080 PROCcreate_key(14)
3090 FOR r%=20 TO 50 STEP 10
3100 FOR i%=r% TO r%+4
3110 PROCcreate_key(i%)
3120 NEXT
3130 NEXT
3140 ENDPROC
3150 :
3160 DEF PROCcreate_key(k%)
3170 LOCAL x%,y%
3180 x%=(k% MOD kcol%)*ktw%
3190 y%=(k% DIV kcol%)*kth%+kh%
3200 khandle%(k%)=FNcr_icon(x%,y%,kw%,kh%,fbut%(k%),fleg%+k%*6,0,5)
3210 ENDPROC
3220 :
3230 DEF PROCcreate_display
3240 PROCdelete_panel
3250 IF disp%>0 ENDPROC
3260 ih%(0)=FNcr_icon(0,kth%+kh%,ktw%*3+kw%,kh%,&50003131,display%,0,20)
3270 ih%(1)=FNcr_icon(0,kh%,ktw%,kh%,&53000131,radann%,0,3)
3280 ih%(2)=FNcr_icon(ktw%,kh%,ktw%,kh%,&5F000131,memann%,0,3)
3290 ih%(3)=FNcr_icon(2*ktw%,kh%,ktw%,kh%,&53000131,brkann%,0,3)
3300 ih%(4)=FNcr_icon(3*ktw%,kh%,ktw%,kh%,&5B000131,errann%,0,3)
3310 disp%=1
3320 ENDPROC
3330 :
3340 DEF PROCdelete_display
3350 LOCAL i%
3360 IF disp%=0 ENDPROC
3370 FOR i%=4 TO 0 STEP -1
3380 PROCde_icon(ih%(i%))
3390 NEXT
3400 disp%=0
3410 ENDPROC
3420 :
3430 DEF PROCcreate_panel(k%)
3440 LOCAL i%,tok%
3450 PROCdelete_display
3460 PROCdelete_panel
3470 $exp%=fexp$(k%)
3480 FOR i%=0 TO 5
3490 i%?newleg%=i%?(fleg%+6*k%)
3500 NEXT
3510 ih%(0)=FNcr_icon(0,kh%,8+kcw%*7,kh%,&50000131,legtxt%,0,7)
3520 ih%(1)=FNcr_icon(kcw%*7,kh%,kw%,kh%,&5000F13D,newleg%,0,6)
3530 FOR i%=2 TO 5
3540 ih%(i%)=-1
3550 NEXT
3560 tok%=ftok%(k%)
3570 IF tok%<0 OR (tok%>9 AND tok%<16) THEN
3580 IF tok%<0 THEN $par%=CHR$(47-tok%) ELSE $par%=CHR$(ASC("A")+tok%-10)
3590 ih%(2)=FNcr_icon(kcw%*14,kh%,8+kcw%*2,kh%,&50000131,partxt%,0,2)
3600 ih%(3)=FNcr_icon(kcw%*16,kh%,16+kcw%,kh%,&5000F131,par%,parval%,2)
3610 ih%(4)=FNcr_icon(0,kth%+kh%,8+kcw%*1,kh%,&50000131,exptxt%,0,2)
3620 ih%(5)=FNcr_icon(kcw%*2,kth%+kh%,8+kcw%*17,kh%,&5000F131,exp%,0,32)
3630 ENDIF
3640 panel%=k%
3650 ENDPROC
3660 :
3670 DEF PROCredraw_display
3680 SYS "Wimp_ForceRedraw",windhandle%,0,-kth%*2,ktw%*4,0
3690 ENDPROC
3700 :
3710 DEF PROCdelete_panel
3720 LOCAL i%,c%
3730 IF panel%<0 ENDPROC
3740 IF NOT cancel% THEN
3750 IF ftok%(panel%)<0 THEN
3760 IF par%?0=13 par%?0=48
3770 IF par%?0>=ASC("A") THEN
3780 ftok%(panel%)=par%?0-ASC("A")+10
3790 c%=ckeyp%
3800 ELSE
3810 ftok%(panel%)=-(par%?0-48+1)
3820 IF ftok%(panel%)=-3 c%=cdyad%
3830 IF ftok%(panel%)=-2 c%=cmono%
3840 IF ftok%(panel%)=-1 c%=ccons%
3850 fbut%(panel%)=c%<<28 OR &313D
3860 ENDIF
3870 ENDIF
3880 fexp$(panel%)=""
3890 i%=0
3900 WHILE exp%?i%<>13
3910 fexp$(panel%)+=CHR$(exp%?i%)
3920 i%+=1
3930 ENDWHILE
3940 FOR i%=0 TO 5
3950 i%?(fleg%+6*panel%)=i%?newleg%
3960 NEXT
3970 ENDIF
3980 FOR i%=5 TO 0 STEP -1
3990 IF ih%(i%)>-1 PROCde_icon(ih%(i%))
4000 NEXT
4010 panel%=-1
4020 PROCput_user_keys
4030 IF NOT cancel% PROCsave_user_keys(keypad%)
4040 ENDPROC
4050 :
4060 DEF PROCput_user_keys
4070 LOCAL i%
4080 icb%!0=windhandle%
4090 icb%!12=&FFFFFFFF
4100 FOR i%=0 TO klast%
4110 icb%!4=khandle%(i%)
4120 icb%!8=fbut%(i%)
4130 SYS "Wimp_SetIconState",0,icb%
4140 NEXT
4150 ENDPROC
4160 :
4170 DEF FNcr_icon(x%,y%,w%,h%,flags%,da%,va%,lng%)
4180 LOCAL handle%
4190 icb%!0=windhandle%
4200 icb%!4=border%+x%
4210 icb%!8=-(border%+y%)
4220 icb%!12=icb%!4+w%
4230 icb%!16=icb%!8+h%
4240 icb%!20=flags%
4250 icb%!24=da%
4260 icb%!28=va%
4270 icb%!32=lng%
4280 SYS "Wimp_CreateIcon",0,icb% TO handle%
4290 =handle%
4300 :
4310 DEF PROCde_icon(ih%)
4320 icb%!0=windhandle%
4330 icb%!4=ih%
4340 SYS "Wimp_DeleteIcon",0,icb%
4350 ENDPROC
4360 :
4370 DEF PROCput_display
4380 IF m=0 THEN $memann%="" ELSE $memann%="Mem"
4390 IF degrees% THEN $radann%="Deg" ELSE $radann%="Rad"
4400 IF nest%=0 THEN $brkann%="" ELSE $brkann%="("+CHR$(48+nest%)+")"
4410 IF errlock%=TRUE THEN
4420 $errann%="Err"
4430 $display%=errtxt$
4440 ELSE
4450 $errann%=""
4460 IF hexint% THEN $display%="HEX "+STR$~(d) ELSE $display%=STR$(d)
4470 ENDIF
4480 ENDPROC
4490 :
4500 DEF PROCdo_key(k%)
4510 LOCAL token%
4520 token%=ftok%(k%)
4530 IF token%>-1 AND token%<17 THEN
4540 PROCenter(token%)
4550 ELSE
4560 CASE token% OF
4570 WHEN 18:PROClbra
4580 WHEN 19:PROCrbra
4590 WHEN 20:PROCaddm
4600 WHEN 21:PROCsetm
4610 WHEN 22:PROCrecm
4620 WHEN 23:PROCclr
4630 WHEN 24:PROCdegrad
4640 WHEN 25:PROCclrm
4650 WHEN 26:PROCflip
4660 WHEN 27:PROChex
4670 OTHERWISE:PROCoper_key(k%)
4680 ENDCASE
4690 ENDIF
4700 ENDPROC
4710 :
4720 DEF PROCclr
4730 errlock%=FALSE
4740 t=0:x=0:d=0
4750 newent%=TRUE
4760 op$=nop$
4770 nest%=0
4780 ENDPROC
4790 :
4800 DEF PROCflip
4810 d=-d
4820 x=d
```

```
4830 ENDPROC
4840 :
4850 DEF PROCaddm
4860 m+=x
4870 newent%=TRUE
4880 ENDPROC
4890 :
4900 DEF PROCrecm
4910 x=m
4920 d=x
4930 newent%=TRUE
4940 ENDPROC
4950 :
4960 DEF PROCsetm
4970 m=x
4980 newent%=TRUE
4990 ENDPROC
5000 :
5010 DEF PROCclrm
5020 m=0
5030 newent%=TRUE
5040 ENDPROC
5050 :
5060 DEF PROCdegrad
5070 degrees%=NOT degrees%
5080 ENDPROC
5090 :
5100 DEF PROChex
5110 hexint%=NOT hexint%
5120 ENDPROC
5130 :
5140 DEF PROClbra
5150 IF nest%>9 ENDPROC
5160 nest%+=1
5170 stackop$(nest%)=op$
5180 stackt(nest%)=t
5190 newent%=TRUE
5200 t=0:x=0:d=0:op$=nop$
5210 ENDPROC
5220 :
5230 DEF PROCrbra
5240 IF nest%<1 ENDPROC
5250 IF op$<>nop$ x=EVAL(op$)
5260 op$=stackop$(nest%)
5270 t=stackt(nest%)
5280 d=x
5290 newent%=TRUE
5300 nest%-=1
5310 ENDPROC
5320 :
5330 DEF PROCenter(tok%)
5340 IF newent% THEN
5350 d=0
5360 dpent%=0
5370 newent%=FALSE
5380 ENDIF
5390 IF hexint% THEN
5400 IF tok%>15 ENDPROC
5410 d=d*16+tok%
5420 ELSE
5430 IF tok%>9 AND tok%<>16 ENDPROC
5440 IF tok%=16 THEN
5450 IF dpent%>0 ENDPROC
5460 dpent%=1
5470 ELSE
5480 IF dpent%>0 THEN d+=(tok%/10^dpent
%):dpent%+=1 ELSE d=d*10+tok%
5490 ENDIF
5500 ENDIF
5510 ENDIF
5520 x=d
5530 ENDPROC
5540 :
5550 DEF PROCoper_key(k%)
5560 LOCAL token%
5570 token%=ftok%(k%)
5580 IF token%=17 THEN
5590 t=EVAL(op$):x=t:d=t:op$=nop$
5600 ELSE
5610 IF token%<>-3 THEN
5620 x=EVAL(fexp$(k%)):d=x
5630 ELSE
5640 t=EVAL(op$):d=t:op$=fexp$(k%)
5650 ENDIF
5660 ENDIF
5670 newent%=TRUE
5680 ENDPROC
5690 :
5700 DEF FNcvtr(angle)
5710 IF degrees% THEN =RAD(angle) ELSE
=angle
5720 :
5730 DEF FNcvfr(rad)
5740 IF degrees% THEN =DEG(rad) ELSE =r
ad
5750 :
5760 DEF FNfact(v)
5770 LOCAL x,v%
5780 v%=INT(v)
5790 x=1
5800 IF v%<>v OR v%<1 ERROR 6,"Positive
 int needed"
5810 WHILE v%>1:x=x*v%:v%-=1:ENDWHILE
5820 =x
```

Listing 3 - MindRead

```
 10 REM >MindRead (Info3)
 20 REM by Robin Owens
 30 REM for all machines
 40 REM (c) BAU September 1992
 50 :
 60 MODE 0
 70 DIM comb_o%(255),comb_z%(255)
 80 FOR x%=0 TO 255
 90 comb_o%(x%)=1
100 comb_z%(x%)=1
110 NEXT
120 prev%=0
130 corr%=0
140 corrg%=0
150 CLS
160 try%=1
170 REPEAT
180 IF comb_o%(prev%)<comb_z%(prev%) T
HEN one%=0 ELSE one%=1
190 g$=GET$
200 IF g$="1" THEN comb_o%(prev%)=comb
_o%(prev%)+1
210 IF g$="0" THEN comb_z%(prev%)=comb
_z%(prev%)+1
220 prev%=prev%*2
230 prev%=prev% AND 15
240 IF g$="1" THEN prev%=prev%+1
250 ge%=INT(RND(2))-1
260 IF ge%=one% THEN corrg%=corrg%+1
270 PRINT try%;" ",(corr%/try%)*100;"
",(corrg%/try%)*100
280 IF (g$="1" AND one%=1) OR (g$="0"
AND one%=0) THEN corr%=corr%+1
290 try%=try%+1
300 UNTIL FALSE
310 END
```

Listing 4 - Smooth

```
 10 REM >Smooth (Info4)
 20 REM by David Walters
 30 REM for 32 bit machines only
 40 REM (C) BAU September 1992
 50 :
 60 m=100
 70 :
 80 MODE 12
 90 OFF
100 MOUSE ON
110 DIM x(m),y(m)
120 p=1
130 GCOL0,1
140 REPEAT
150 p+=1
160 PROCmouse(x(p),y(p),b)
170 IF p>2 LINE x(p-1),y(p-1),x(p),y(p
)
180 CIRCLE x(p),y(p),10
190 UNTIL b=2 OR p=(m-2)
200 CLS
210 PROCsmooth(2,p)
220 drag%=FALSE
230 REPEAT
240 IF drag% THEN
250 PROCsmooth(drag%-2,drag%+1)
260 MOUSE x(drag%),y(drag%),but
270 PROCsmooth(drag%-2,drag%+1)
280 IF but=0 drag%=FALSE
290 ELSE
300 PROCmouse(x(m),y(m),b)
310 FOR i=2 TO p
320 IF FNdist(i,i,m,m)<10 drag%=i
330 NEXT
340 ENDIF
350 UNTIL FALSE
360 END
370 :
380 DEFPROCsmooth(s,q)
390 IF s<2 s=2
400 IF q>p q=p
410 x(1)=x(2)
420 y(1)=y(2)
430 x(p+1)=x(p)
440 y(p+1)=y(p)
450 FOR n=s-1 TO q
460 GCOL3,1
470 CIRCLE x(n),y(n),10
480 IF n=s-1 PROCbcde:n+=1
490 a=FNa*SGN(d)
500 cp1x=SINRAD(c-a)*e+x(n)
510 cp1y=COSRAD(c-a)*e+y(n)
520 PROCbcde
530 a=FNa*SGN(e)
540 cp2x=SINRAD(b+a)*d+x(n+1)
550 cp2y=COSRAD(b+a)*d+y(n+1)
560 PROCcurve(x(n),y(n),cp1x,cp1y,cp2x
,cp2y,x(n+1),y(n+1))
570 NEXT
580 ENDPROC
590 :
600 DEF FNa
610 a=b-c
620 IF a>180 a=-(360-ABS(a))*SGN(a)
630 =(90-ABS(a)/2)*SGN(a)
640 :
650 DEF PROCbcde
660 b=FNdeg(n+1,n+1,n,n)
670 c=FNdeg(n+1,n+1,n+2,n+2)
680 d=FNdist(n,n,n+1,n+1)
690 e=FNdist(n+1,n+1,n+2,n+2)
700 ENDPROC
710 :
720 DEF PROCcurve(x0,y0,x1,y1,x2,y2,x3
,y3)
730 LOCAL x,y,n,t,t1
740 GCOL3,2
750 n=10
760 MOVE x0,y0
770 x1=x1+2*x0
780 y1=y1+2*y0
790 x2=x2+2*x3
800 y2=y2+2*y3
810 FOR I=0 TO n
820 t=I/n
830 t1=1-t
840 x=x0*t1^3+x1*t*t1^2+x2*t1*t^2+x3*t
^3
850 y=y0*t1^3+y1*t*t1^2+y2*t1*t^2+y3*t
^3
860 DRAW x,y
870 NEXT
880 ENDPROC
890 :
900 DEF FNdeg(a,b,x,y)
910 =90-DEG(ATN(((y(y)-y(b))/(x(x)-x(a
)-(x(x)=x(a))*.01))/1))-180*(x(a)>x(x))
920 :
930 DEF FNdist(a,b,x,y)
940 =SQR((x(a)-x(x))^2+(y(b)-y(y))^2)
950 :
960 DEF PROCmouse(RETURN x,RETURN y,RE
TURN b)
970 REPEAT
980 MOUSE x,y,b
990 UNTIL b=0
1000 REPEAT
1010 MOUSE x,y,b
1020 UNTIL b
1030 ENDPROC
```

Listing 5 - Wave8

```
 10 REM >Wave8 (Info5)
 20 REM by DCA, based on a program
 30 REM by Michel Grimminck
 40 REM for 8-bit only
 50 REM (c) BAU September 1992
 60 :
 70 MODE 4
 80 HIMEM=&3300
 90 bands%=4
100 n=32
110 yoff=128-48
120 tabsize%=n*n*2
130 DIM code% &4C0,loop(3),preloop(3),
plot(3)
140 scrlo%=&3300
150 scrhi%=&3400
160 div4lo%=&3500
170 div4hi%=&3600
180 bit%=&3700
190 xpos%=&3800
200 ypos%=&3C00
210 ytablo%=&4000
220 ytabhi%=&4400
230 vytablo%=&4800
240 vytabhi%=&4C00
250 oldlo%=&5000
260 oldhi%=&5400
270 temp=&70
280 ro=&72
290 ro2=&74
300 tot=&76
310 last=&78
320 tab=&80
330 FOR pass%=0 TO 2 STEP 2
340 P%=code%
350 [OPT pass%
360 .wave
370 LDX #n-1
380 .copytandb
390 LDA ytablo%+n,X
400 STA ytablo%,X
410 LDA ytabhi%+n,X
420 STA ytabhi%,X
430 LDA ytablo%+n*(n-2),X
440 STA ytablo%+n*(n-1),X
450 LDA ytabhi%+n*(n-2),X
460 STA ytabhi%+n*(n-1),X
470 DEX
480 BPL copytandb
490 :
500 LDX #0
510 .copylandr
520 ]
530 FOR k%=0 TO bands%-1
540 j%=k%*256
550 [OPT pass%
560 LDA ytablo%+j%+1,X
570 STA ytablo%+j%,X
580 LDA ytablo%+j%+n-2,X
590 STA ytablo%+j%+n-1,X
600 LDA ytabhi%+j%+1,X
610 STA ytabhi%+j%,X
620 LDA ytabhi%+j%+n-2,X
630 STA ytabhi%+j%+n-1,X
640 ]
650 NEXT k%
660 [OPT pass%
670 TXA
680 CLC
690 ADC #n
700 TAX
710 BNE copylandr
720 ]
730 FOR k%=0 TO bands%-1
740 j%=k%*256
750 IF k%=0 OR k%=3 THEN [OPT pass%:LD
X #256-n:] ELSE [OPT pass%:LDX #0:]
760 IF k%=0 j%=j%+n
770 [OPT pass%
780 .preloop(k%)
790 DEX
800 DEX
810 .loop(k%)
820 LDA ytablo%+j%,X
830 STA temp
840 LDA ytabhi%+j%,X
850 ASL temp
860 ROL A
870 ASL temp
880 ROL A
890 STA temp+1
900 LDA ytablo%+j%-n,X
910 CLC
920 ADC ytablo%+j%+n,X
930 TAY
940 LDA ytabhi%+j%-n,X
950 ADC ytabhi%+j%+n,X
960 PHA
970 TYA
980 CLC
990 ADC ytablo%+j%-1,X
1000 TAY
1010 PLA
1020 ADC ytabhi%+j%-1,X
1030 PHA
1040 TYA
1050 CLC
1060 ADC ytablo%+j%+1,X
1070 TAY
1080 PLA
1090 ADC ytabhi%+j%+1,X
1100 STA tot+1
1110 TYA
1120 SEC
1130 SBC temp
1140 STA tot
1150 LDA tot+1
1160 SBC temp+1
1170 STA tot+1
1180 LDA #0
1190 ASL tot
1200 ROL tot+1
1210 BCC P%+4
1220 LDA #255
1230 ROL A
1240 ASL tot
1250 ROL tot+1
1260 ROL A
1270 STA tot \ high byte!
1280 LDY vytabhi%+j%,X
1290 LDA vytablo%+j%,X
1300 SEC
1310 SBC div4lo%,Y
1320 STA temp
1330 TYA
1340 SBC div4hi%,Y
1350 TAY
1360 LDA temp
1370 CLC
1380 ADC tot+1
1390 STA vytablo%+j%,X
1400 TYA
1410 ADC tot
1420 STA vytabhi%+j%,X
1430 DEX
1440 TXA
1450 AND #31
1460 BNE loop(k%)
1470 CPX #0
1480 BNE preloop(k%)
1490 ]
1500 NEXT k%
1510 FOR k%=0 TO bands%-1
1520 j%=k%*256
1530 [OPT pass%
1540 .plot(k%)
1550 LDA oldlo%+j%,X
1560 STA last
1570 LDA oldhi%+j%,X
1580 STA last+1
1590 LDA ytablo%+j%,X
1600 CLC
1610 ADC vytablo%+j%,X
1620 STA ytablo%+j%,X
1630 LDA ytabhi%+j%,X
1640 ADC vytabhi%+j%,X
1650 STA ytabhi%+j%,X
1660 TAY
1670 LDA div4lo%,Y
1680 CLC
1690 ADC ypos%+j%,X
1700 TAY
1710 LDA xpos%+j%,X
1720 CLC
1730 ADC scrlo%,Y
1740 STA temp
1750 STA oldlo%+j%,X
1760 LDA scrhi%,Y
1770 ADC #0
1780 STA temp+1
1790 STA oldhi%+j%,X
1800 LDA bit%,X
1810 LDY #0
1820 EOR (temp),Y
1830 STA (temp),Y
1840 LDA bit%,X
1850 EOR (last),Y
1860 STA (last),Y
1870 INX
1880 BNE plot(k%)
1890 ]
1900 NEXT k%
1910 [OPT pass%
1920 RTS
1930 :
1940 .cycle
1950 LDX #63
1960 .cycleloop
1970 LDA sinlo%,X
1980 STA ytablo%+n+1
1990 LDA sinhi%,X
2000 STA ytabhi%+n+1
2010 LDA #0
2020 STA vytablo%+n+1
2030 STA vytabhi%+n+1
2040 TXA
2050 PHA
2060 JSR wave
2070 PLA
2080 TAX
2090 DEX
2100 BPL cycleloop
2110 BIT &FF
2120 BPL cycle
2130 RTS
2140 ]
2150 sinlo%=P%:P%=P%+64
```

```
 2160 sinhi%=P%:P%=P%+64
 2170 NEXT pass%
 2180 !tab=&10204080
 2190 tab!4=&01020408
 2200 PRINT"Please wait..."
 2210 FOR i%=0 TO n*n-1 STEP 4
 2220 i%!ytablo%=0
 2230 i%!ytabhi%=0
 2240 i%!vytablo%=0
 2250 i%!vytabhi%=0
 2260 i%!oldlo%=0
 2270 i%!oldhi%=&58585858
 2280 NEXT
 2290 FOR i%=0 TO 63
 2300 a%=&4000*SIN(i%*PI/32)
 2310 sinlo%?i%=a% MOD 256
 2320 sinhi%?i%=a% DIV 256
 2330 NEXT
 2340 FOR i%=0 TO 255
 2350 a%=&5800+48+320*(i% DIV 8)+(i% AND
 7)
 2360 scrlo%?i%=a% MOD 256
 2370 scrhi%?i%=a% DIV 256
 2380 v%=i% DIV 4
 2390 IF v%>31 v%=v%-64
 2400 div4lo%?i%=v% AND &FF
 2410 div4hi%?i%=(v% AND &FF00) DIV 256
 2420 NEXT
 2430 FOR i%=0 TO n-1
 2440 FOR j%=0 TO n-1
 2450 xpos%?(i%+n*j%)=(4*i%+3*j%) AND 24
8
 2460 ypos%?(i%+n*j%)=yoff+3*j%
 2470 NEXT
 2480 FOR j%=0 TO n/4-1
 2490 bit%?(i%+n*j%)=tab?((4*i%+3*j%) AN
D 7)
 2500 NEXT
 2510 NEXT
 2520 CLS
 2530 VDU 23;8202;0;0;0;
 2540 CALL cycle
 2550 END
```

Listing 6 - Wave32

```
   10 REM >Wave32 (Info6)
   20 REM by DCA, base on a program
   30 REM by Michel Grimminck
   40 REM for 32-bit only
   50 REM (c) BAU September 1992
   60 :
   70 MODE 13
   80 OFF
   90 PROCass
  100 PRINT "Please wait..."
  110 FOR i%=0 TO side*side-1
  120 height!(4*i%)=0
  130 velocity!(4*i%)=0
  140 NEXT
  150 ORIGIN 640,512
  160 !scale=11
  170 DIM x(1),y(1)
  180 x(0)=side DIV 4
  190 x(1)=3*(side DIV 4)
  200 y(0)=side DIV 4
  210 y(1)=3*(side DIV 4)
  220 t%=0
  230 ang%=0
  240 PRINTTAB(33,0)"+ and -"TAB(34,1)"c
hange"TAB(34,2)"scale"
  250 REPEAT
  260 CALL wave
  270 FOR i%=0 TO 1
  280 height!(4*(x(i%)+side*y(i%)))=(2^1
8)*COSRAD(ang%)
  290 velocity!(4*(x(i%)+side*y(i%)))=0
  300 NEXT
  310 ang%+=2
  320 CASE INKEY$(0) OF
  330 WHEN "+","=":!scale-=1
  340 WHEN "-","_":!scale+=1
  350 ENDCASE
  360 UNTIL FALSE
  370 :
  380 DEF PROCass
  390 log2side=7
  400 side=2^log2side
  410 DIM code% &1000+8*(side*side)
  420 friction=10
  430 tension=4
  440 sp=13:link=14:pc=15
  450 FOR pass%=0 TO 2 STEP 2
  460 P%=code%
  470 WHILE P% MOD 16<>8
  480 P%+=4
  490 ENDWHILE
  500 [OPT pass%
  510 .wave   STMFD   (sp)!,{r0-r12,link
}
  520 ADR     r0,vlist
  530 ADR     r1,scrst
  540 SWI     "XOS_ReadVduVariables"
  550 LDR     r8,scale
  560 RSB     r8,r8,#25
  570 LDR     r9,scrst
  580 ADR     r10,height
  590 ADD     r11,r10,#side*side*4
  600 MOV     r12,r11
  610 .add    MOV     r14,#side
  620 .add2   LDMIA   (10),{r0-r3}
  630 LDMIA   (11)!,{r4-r7}
  640 ADD     r0,r0,r4
  650 ADD     r1,r1,r5
  660 ADD     r2,r2,r6
  670 ADD     r3,r3,r7
  680 STMIA   (10)!,{r0-r3}
  690 MOV     r0,r0,LSL r8
  700 MOV     r1,r1,LSL r8
  710 MOV     r2,r2,LSL r8
  720 MOV     r3,r3,LSL r8
  730 ADR     r4,colourtab
  740 LDRB    r0,[r4,r0,LSR #25]
  750 LDRB    r1,[r4,r1,LSR #25]
  760 LDRB    r2,[r4,r2,LSR #25]
  770 LDRB    r3,[r4,r3,LSR #25]
  780 ORR     r0,r0,r0,LSL #8
  790 ORR     r1,r1,r1,LSL #8
  800 ORR     r0,r0,r1,LSL #16
  810 ORR     r2,r2,r2,LSL #8
  820 ORR     r3,r3,r3,LSL #8
  830 ORR     r1,r2,r3,LSL #16
  840 ADD     r2,r9,#320
  850 STMIA   (2),{r0-r1}
  860 STMIA   (9)!,{r0-r1}
  870 SUBS    r14,r14,#4
  880 BNE     add2
  890 ADD     r9,r9,#(320-2*side)+320
  900 CMP     r10,r12
  910 BLT     add
  920 ADR     r0,height
  930 ADD     r1,r0,#side*4
  940 ADD     r2,r0,#side*(side-1)*4
  950 SUB     r3,r2,#side*4
  960 MOV     r14,#side
  970 .copy1  LDMIA   (1)!,{r4-r11}
  980 STMIA   (0)!,{r4-r11}
  990 LDMIA   (3)!,{r4-r11}
 1000 STMIA   (2)!,{r4-r11}
 1010 SUBS    r14,r14,#8
 1020 BNE     copy1
 1030 ADR     r3,height
 1040 ADD     r4,r3,#(side-1)*4
 1050 MOV     r2,#side
 1060 .copy2  LDR     r8,[r3,#4]
 1070 STR     r8,[r3],#side*4
 1080 LDR     r8,[r4,#-4]
 1090 STR     r8,[r4],#side*4
 1100 SUBS    r2,r2,#1
 1110 BNE     copy2
 1120 MOV     r1,#side-2
 1130 ADR     r3,height
 1140 ADD     r3,r3,#side*4
 1150 ADD     r4,r3,#velocity-height
 1160 .loop   STMFD   (sp)!,{r1}
 1170 LDMIA   (3)!,{r9-r12}
 1180 ADD     r4,r4,#4
 1190 MOV     r2,#side-2
 1200 SUB     r14,r3,#side*4+12
 1210 .loop2  ADD     r0,r14,#2*side*4
 1220 LDMIA   (0),{r7,r8}
 1230 LDMIA   (14)!,{r5,r6}
 1240 LDMIA   (4),{r0-r1}
 1250 SUB     r0,r0,r0,ASR #friction
 1260 ADD     r0,r0,r9,ASR #tension
 1270 ADD     r0,r0,r11,ASR #tension
 1280 ADD     r0,r0,r5,ASR #tension
 1290 ADD     r0,r0,r7,ASR #tension
 1300 SUB     r0,r0,r10,ASR #tension-2
 1310 SUB     r1,r1,r1,ASR #friction
 1320 ADD     r1,r1,r10,ASR #tension
 1330 ADD     r1,r1,r12,ASR #tension
 1340 ADD     r1,r1,r6,ASR #tension
 1350 ADD     r1,r1,r8,ASR #tension
 1360 SUB     r1,r1,r11,ASR #tension-2
 1370 STMIA   (4)!,{r0-r1}
 1380 MOV     r9,r11
 1390 MOV     r10,r12
 1400 LDMIA   (3)!,{r11,r12}
 1410 SUBS    r2,r2,#2
 1420 BNE     loop2
 1430 LDMFD   (sp)!,{r1}
 1440 SUB     r3,r3,#8
 1450 ADD     r4,r4,#4
 1460 SUBS    r1,r1,#1
 1470 BNE     loop
 1480 LDMFD   (sp)!,{r0-r12,pc}
 1490 :
 1500 .scale  EQUD    0
 1510 .vlist  EQUD    148
 1520 EQUD    -1
 1530 .scrst  EQUD    0
 1540 ]
 1550 colourtab=P%:P%+=128
 1560 WHILE P% MOD 16<>4
 1570 P%+=4
 1580 ENDWHILE
 1590 height=P%:P%+=4*side*side
 1600 velocity=P%:P%+=4*side*side
 1610 NEXT pass%
 1620 FOR q=0 TO 127 STEP 32
 1630 s=0
 1640 READ a$,ch
 1650 FOR t=0 TO 31
 1660 a=EVAL("&"+MID$(a$,t*2+1,2))
 1670 colourtab?(q+t)=a
 1680 s+=a
 1690 NEXT
 1700 IF s<>ch THEN PRINT'"Checksum erro
r at DATA line ";q/32+1
 1710 NEXT
 1720 ENDPROC
 1730 :
 1740 DATA FFDFDEDDDCB3B2B1B00F0E0D0C0D0
E0F98999ABABBBAB9B887868584919293,4451
 1750 DATA BCBDBEBFB7B6B5B41B1A1918191A1
B94B4B5B6B73F3E3D3C1312111014151617,2940
 1760 DATA 163D3E3F3FD6D7D6D5D43B3A39380
706050430313233 5C5D5E5D5556577C7475,2776
 1770 DATA 76777FF7F6F5F45B5A59582726252
42021000001020 32C2D2ED0D1D2D3FCFDFE,3657
```

Listing 7 - Contrast

```
   10 REM >Contrast (Info7)
   20 REM Drawfile 'contrast control'
   30 REM by P Drinkwater
   40 REM for 32-bit machines
   50 REM (c) BAU September 1992
   60 :
   70 ON ERROR PRINT"";REPORT$;" AT LINE
 ";ERL:END
   80 PROCsetvariables
   90 outputfile$=FNenterfilespecificati
ons
  100 PROCtranslatefile(outputfile$)
  110 END
  120 :
  130 DEF PROCtranslatefile(outputfile$)
  140 channel=OPENUP(outputfile$)
  150 filepointer=40
  160 PTR#channel=filepointer
  170 REPEAT
  180 type=FNreadtypeofobject
  190 size=FNreadsizeofobject
  200 CASE type OF
  210 WHEN 0:endoffile=FNmissobject(size
)
  220 WHEN 1:endoffile=FNfoundtext(size)
  230 WHEN 2:endoffile=FNfoundpath(size)
  240 WHEN 3:endoffile=FNmissobject(size
)
  250 WHEN 4:endoffile=FNmissobject(size
)
  260 WHEN 5:endoffile=FNfoundsprite(siz
e)
  270 WHEN 6:endoffile=FNfoundgroup
  280 WHEN 7:endoffile=FNmissobject(size
)
  290 WHEN 8:endoffile=FNmissobject(size
)
  300 WHEN 9:endoffile=FNmissobject(size
)
  310 ENDCASE
  320 UNTIL endoffile
  330 CLOSE#channel
  340 END
  350 :
  360 DEF PROCsetvariables
  370 DIM colour 4,sprname 12
  380 red=37/(100/3)
  390 green=43/(100/3)
  400 blue=20/(100/3)
  410 CLOSE#0
  420 PROCresetvariables
  430 ENDPROC
  440 :
  450 DEF PROCresetvariables
  460 contshift%=0
  470 shift%=0
  480 endoffile=FALSE
  490 ENDPROC
  500 :
  510 DEF FNenterfilespecifications
  520 PROCresetvariables
  530 INPUT"Please enter the source file
 name : "inputfile$
  540 INPUT"Please enter the destination
 file name : "outputfile$
  550 OSCLI"REMOVE "+outputfile$
  560 OSCLI"COPY "+inputfile$+" "+output
file$+" ~C~F~V"
  570 SYS "PDriver_Info" TO ,x,y
  580 startvalforprinter%=-1
  590 IF x=240 AND y=216 THEN startvalfo
rprinter%=110
  600 IF x=240 AND y=144 THEN startvalfo
rprinter%=90
  610 IF x=120 AND y=144 THEN startvalfo
rprinter%=40
  620 IF x=90 AND y=72 THEN startvalforp
rinter%=0
  630 IF x=60 AND y=72 THEN startvalforp
rinter%=0
  640 IF startvalforprinter%=-1 THEN PRI
NT'"Sorry. Cannot match printer resoluti
on to one recognised.":END
  650 PRINT'"With contrast value , a pos
itive value will make the greys more dis
sipated (contrast up). Values between -1
00 and 100 are acceptable"
  660 INPUT"Please enter the contrast va
lue : "contrast%
  670 IF contrast%<>0 THEN
  680 oldstartvalforprinter%=startvalfor
printer%
  690 contrast%+=100
  700 startvalforprinter%=256-((256-star
tvalforprinter%)*(contrast%/100))
  710 ELSE
  720 oldstartvalforprinter%=startvalfor
printer%
  730 ENDIF
  740 IF startvalforprinter%>256 THEN st
artvalforprinter%=256
  750 midgrey=(256-startvalforprinter%)/
2+startvalforprinter%
  760 contshift%=FNcalcgreyforcontshift(
128)-midgrey
  770 PRINT'"With shift value (BRIGHTNES
S), positive values gives a lighter imag
e (brightness up). Values between -100 a
nd 100 are acceptable"
  780 INPUT"Please enter the shift value
 : "shift%
  790 shift%=shift%*2.56
  800 =outputfile$
  810 :
  820 DEF FNreadtypeofobject
  830 type=FNreadwordat_fp
  840 filepointer+=4
  850 PTR#channel=filepointer
  860 =type
  870 :
  880 DEF FNreadsizeofobject
  890 size=FNreadwordat_fp
  900 filepointer+=4+16
  910 PTR#channel=filepointer
  920 =size
  930 :
  940 DEF FNfoundgroup
  950 filepointer+=12
  960 IF EXT#channel<=filepointer THEN e
ndoffile=TRUE ELSE PTR#channel=filepoint
er
  970 =endoffile
  980 :
  990 DEF FNmissobject(size)
 1000 filepointer+=size-24
 1010 IF EXT#channel<=filepointer THEN e
ndoffile=TRUE ELSE PTR#channel=filepoint
er
 1020 =endoffile
 1030 :
 1040 DEF FNfoundsprite(size)
 1050 PROCholdvalueof_fp
 1060 PTR#channel=filepointer+32
 1070 offset=FNreadwordat_fp
 1080 PTR#channel=filepointer+4
 1090 sname$=FNreadcurrspritesname
 1100 filepointer+=40
 1110 PTR#channel=filepointer
 1120 mode=BGET#channel
 1130 SYS "OS_ReadModeVariable",mode,9 T
O ,,bpp
 1140 IF bpp=0 THEN change=4
 1150 IF bpp=1 THEN change=8
 1160 IF bpp=2 THEN change=32
 1170 IF bpp=3 THEN PRINT'"This program
cannot handle 3 bpp sprites":END
 1180 IF 44+(4*change)=offset THEN
 1190 filepointer+=4
 1200 PTR#channel=filepointer
 1210 FOR count=1 TO change
 1220 PROCchangecolofnextbyte
 1230 NEXT
 1240 ELSE
 1250 PRINT"Found a sprite without a pal
ette (named '";sname$;"'). Ignoring"
 1260 ENDIF
 1270 endoffile=FNrecalloldvalueof_fp(si
ze)
 1280 =endoffile
 1290 :
 1300 DEF FNfoundtext(size)
 1310 PROCholdvalueof_fp
 1320 PROCchangecolofnextbyte
 1330 PROCchangecolofnextbyte
 1340 endoffile=FNrecalloldvalueof_fp(si
ze)
 1350 =endoffile
 1360 :
 1370 DEF FNfoundpath(size)
 1380 PROCholdvalueof_fp
 1390 PROCchangecolofnextbyte
 1400 PROCchangecolofnextbyte
 1410 endoffile=FNrecalloldvalueof_fp(si
ze)
 1420 =endoffile
 1430 :
 1440 DEF PROCchangecolofnextbyte
 1450 posfilepointer=filepointer
 1460 col=FNreadwordat_fp
 1470 !colour=col
 1480 PROCstorenewgreyvalue
 1490 PTR#channel=posfilepointer
 1500 PROCwritewordat_fp
 1510 filepointer+=4
 1520 PTR#channel=filepointer
 1530 ENDPROC
 1540 :
 1550 DEF PROCholdvalueof_fp
 1560 oldfilepointer=filepointer
 1570 ENDPROC
 1580 :
 1590 DEF FNrecalloldvalueof_fp(size)
 1600 filepointer=oldfilepointer+size-24
 1610 IF EXT#channel<=filepointer THEN e
ndoffile=TRUE ELSE PTR#channel=filepoint
er
 1620 =endoffile
 1630 :
 1640 DEF PROCstorenewgreyvalue
 1650 r=colour?1
 1660 g=colour?2
 1670 b=colour?3
 1680 IF NOT((r=255 AND g=255 AND b=255)
 OR (r=0 AND g=0 AND b=0)) THEN
 1690 r=colour?1*red
 1700 g=colour?2*green
 1710 b=colour?3*blue
 1720 grey=(r+g+b)/3
 1730 PROCstoregreyvalue(FNcalculatenewg
reyvalue(grey))
 1740 ELSE
 1750 PROCstoregreyvalue(r)
 1760 ENDIF
 1770 ENDPROC
 1780 :
 1790 DEF FNcalculatenewgreyvalue(oldcol
)
 1800 IF oldcol=0 THEN =0
 1810 IF oldcol=255 THEN =255
 1820 =(((255-startvalforprinter%)/16)*(
oldcol/16))-2+startvalforprinter%+shift%
+contshift%
 1830 :
 1840 DEF PROCstoregreyvalue(col)
 1850 IF col<0 THEN col=0
 1860 IF col>255 THEN col=255
 1870 colour?1=col
 1880 colour?2=col
 1890 colour?3=col
 1900 ENDPROC
 1910 :
 1920 DEF FNreadwordat_fp
```




```
1930 =(BGET#channel)+(BGET#channel<<8)+(BGET#channel<<16)+(BGET#channel<<24)
1940 :
1950 DEF PROCwritewordat_fp
1960 BPUT#channel,colour?0
1970 BPUT#channel,colour?1
1980 BPUT#channel,colour?2
1990 BPUT#channel,colour?3
2000 ENDPROC
2010 :
2020 DEF FNcalcgreyforcontshift(oldcol)
2030 =(((255-oldstartvalforprinter%)/16)*(oldcol/16))-2+oldstartvalforprinter%
2040 :
2050 DEF FNreadcurrspritesname
2060 FOR count=0 TO 11
2070 sprname?count=BGET#channel
2080 NEXT
2090 sprname?12=13
2100 =$sprname
```

Listing 8 - BandC

```
10 REM >BandC (Info8)
20 REM By Mark Brundale
30 REM For 32 bit only
40 REM (C) BAU September 1992
50 :
60 *ScreenLoad Screen
70 DIM cols(15,2)
80 FOR col=0 TO 15
90 SYS "OS_ReadPalette",col,16 TO ,,rgb
100 cols(col,0)=(rgb>>8)  AND &FF
110 cols(col,1)=(rgb>>16) AND &FF
120 cols(col,2)=(rgb>>24) AND &FF
130 NEXT
140 MOUSE RECTANGLE -256,0,512,512
150 MOUSE TO 256,0
160 REPEAT
170 MOUSE bright,contrast,z
180 WAIT
190 FOR col=0 TO 15
200 COLOUR col,FNc(col,0),FNc(col,1),FNc(col,2)
210 NEXT
220 UNTIL 0
230 :
240 DEF FNc(c,n)
250 v=contrast+(cols(c,n)*bright) DIV 256
260 IF v<0 THEN =0
270 IF v>255 THEN =255
280 =v
```

Listing 9 - WaterWheel

```
10 REM >WaterWheel (Info9)
20 REM by Bryan Creer
30 REM for 32 bit only
40 REM (C) BAU September 1992
50 :
60 PROCinitial
70 TT%=0
80 R%=0
90 ON ERROR PROCreport
100 T%=TIME
110 REPEAT
120 PRINT TAB(0,31);"Rate of flow - ";inflow;
130 t%=TT%+(TIME-T%)
140 M%=t%/6000
150 S%=(t%/100)MOD60
160 PRINT TAB(34,31);M%;":";S%;
170 PROCscreen
180 PROCfill
190 PROCdrawwheel
200 PROCrecording
210 R%+=1
220 IF R% > 3199 THEN
230 cycleind%=TRUE
240 R%=0
250 ENDIF
260 UNTIL FALSE
270 END
280 :
290 DEF PROCinitial
300 MODE 9
310 COLOUR 0,240,240,240
320 COLOUR 1,0,0,0
330 COLOUR 2,0,0,240
340 COLOUR 7,240,0,0
350 ORIGIN 640,576
360 INPUT TAB(12,15);"Rate of flow";inflow
370 OFF
380 friction = 0.03
390 omega = 0
400 extremeW=0
410 extremeA=0
420 drops%=0
430 cycleind%=FALSE
440 s%=1
450 B%=0
460 DIM point0(2),water(7)
470 point0(2) = 1
480 DIM matrixR(2,2)
490 DIM pointX(7),pointY(7)
500 DIM recordW(3199)
510 DIM recordA(3199)
520 FOR N%=0 TO 7
530 READ X,Y
540 pointX(N%) = X * 320
550 pointY(N%) = Y * 320
560 NEXT
570 PROCrotate(0.15)
580 ENDPROC
590 :
600 DEF PROCscreen
610 WAIT
620 SYS "OS_Byte",113,s%
630 s%=s% EOR 3
640 SYS "OS_Byte",112,s%
650 CLS
660 GCOL 1
670 ENDPROC
680 :
690 DEF PROCfill
700 GCOL 2
710 MOVE -4,448
720 DRAW -4,192
730 MOVE 0,448
740 DRAW 0,192
750 MOVE 4,448
760 DRAW 4,192
770 IF ABS(pointX(B%)) < 60 THEN
780 water(B%) += inflow
790 IF water(B%) > 132 THEN
800 water(B%) = 132
810 ENDIF
820 ELSE
830 IF ABS(pointX((B%+1)MOD8)) < 60 THEN
840 B% = (B%+1) MOD 8
850 water(B%) += inflow
860 IF water(B%) > 132 THEN
870 water(B%) = 132
880 ENDIF
890 ELSE
900 IF ABS(pointX((B%+7)MOD8)) < 60 THEN
910 B% = (B%+7) MOD 8
920 water(B%) += inflow
930 IF water(B%) > 132 THEN
940 water(B%) = 132
950 ENDIF
960 ELSE
970 PROCpour(-4,320)
980 PROCpour(0,288)
990 PROCpour(4,320)
1000 ENDIF
1010 ENDIF
1020 ENDIF
1030 moment=0
1040 FOR N%=0 TO 7
1050 moment -= water(N%)*pointX(N%)
1060 IF water(N%) > 0 THEN
1070 water(N%) -= 0.25
1080 ENDIF
1090 NEXT
1100 accel = moment / 4000000 - omega * friction
1110 omega += accel
1120 ENDIF
1130 PROCrotate(omega)
1140 ENDPROC
1150 :
1160 DEF PROCdrawwheel
1170 MOVE pointX(7),pointY(7)
1180 FOR N%=0 TO 7
1190 GCOL 1
1200 DRAW pointX(N%),pointY(N%)
1210 DRAW 0,0
1220 CIRCLE FILL pointX(N%),pointY(N%),8
1230 MOVE BY -72,-128
1240 GCOL 2
1250 PLOT &61,128,water(N%)
1260 IF water(N%) > 128 THEN
1270 PROCpour(pointX(N%)-68,pointY(N%)+4)
1280 PROCpour(pointX(N%)+68,pointY(N%)+4)
1290 ENDIF
1300 IF water(N%) > 0 THEN
1310 MOVE pointX(N%),pointY(N%)-128
1320 PROCtrickle
1330 ENDIF
1340 MOVE pointX(N%),pointY(N%)
1350 GCOL 1
1360 DRAW BY -64,0
1370 DRAW BY 0,-128
1380 DRAW BY 128,0
1390 DRAW BY 0,128
1400 DRAW BY -64,0
1410 CIRCLE FILL pointX(N%),pointY(N%),8
1420 MOVE pointX(N%),pointY(N%)
1430 NEXT
1440 ENDPROC
1450 :
1460 DEF PROCpour(x%,y%)
1470 MOVE x%,y%
1480 DRAW BY 0,-240 - drops%
1490 PROCtrickle
1500 ENDPROC
1510 :
1520 DEF PROCtrickle
1530 MOVE BY 0,drops%*-16
1540 DRAW BY 0,-16
1550 MOVE BY 0,drops%*-32
1560 DRAW BY 0,-16
1570 MOVE BY 0,drops%*-48
1580 DRAW BY 0,-16
1590 MOVE BY 0,drops%*-64
1600 DRAW BY 0,-16
1610 drops%+=1
1620 drops%=drops% MOD 17
1630 ENDPROC
1640 :
1650 DEF PROCrotate(angle)
1660 PROCsetmatrix(matrixR(),angle)
1670 FOR N%=0 TO 7
1680 point0(0)=pointX(N%)
1690 point0(1)=pointY(N%)
1700 point0() = point0() . matrixR()
1710 pointX(N%)=point0(0)
1720 pointY(N%)=point0(1)
1730 NEXT
1740 ENDPROC
1750 :
1760 DEF PROCsetmatrix(RETURN matrix(),angle)
1770 matrix(0,0) = COS(angle)
1780 matrix(0,1) = SIN(angle)
1790 matrix(1,0) = -SIN(angle)
1800 matrix(1,1) = COS(angle)
1810 matrix(2,2) = 1
1820 ENDPROC
1830 :
1840 DEF PROCrecording
1850 recordW(R%)=omega
1860 recordA(R%)=accel
1870 IF ABS(omega) > extremeW THEN
1880 extremeW = ABS(omega)
1890 ENDIF
1900 IF ABS(accel) > extremeA THEN
1910 extremeA = ABS(accel)
1920 ENDIF
1930 ENDPROC
1940 :
1950 DEF PROCreport
1960 TT%=TT%+TIME-T%
1970 WAIT
1980 SYS "OS_Byte",113,s%
1990 PROCgraph
2000 ON ERROR GOTO 2020
2010 G$=GET$
2020 PROClorentz
2030 ON ERROR GOTO 2050
2040 G$=GET$
2050 ON ERROR OFF
2060 REPEAT
2070 CLS
2080 INPUT TAB(16,15);"Continue";cont$
2090 IF cont$="Y" OR cont$="N" OR cont$="y" OR cont$="n" THEN
2100 cont%=TRUE
2110 ELSE
2120 cont%=FALSE
2130 ENDIF
2140 UNTIL cont%
2150 IF cont$="Y" OR cont$="y" THEN
2160 ORIGIN 640,576
2170 GOTO 90
2180 ELSE
2190 CLS:ON:END
2200 ENDIF
2210 ENDPROC
2220 :
2230 DEF PROCgraph
2240 CLS
2250 ORIGIN 0,512
2260 GCOL 1
2270 MOVE 1276,0
2280 DRAW 0,0
2290 GCOL 7
2300 scale = 500 / extremeW
2310 IF cycleind% THEN
2320 FOR r%=0 TO 319
2330 DRAW r%*4,recordW(((R%+1)+r%*10)MOD3200)*scale
2340 NEXT
2350 ELSE
2360 FOR r%=0 TO 319
2370 DRAW r%*4,recordW((R%+1)*r%/320)*scale
2380 NEXT
2390 ENDIF
2400 PRINT TAB(0,31);inflow;
2410 ENDPROC
2420 :
2430 DEF PROClorentz
2440 CLS
2450 ORIGIN 640,512
2460 GCOL 1
2470 MOVE 0,512
2480 DRAW 0,-512
2490 MOVE -640,0
2500 DRAW 640,0
2510 GCOL 7
2520 scaleW = 600 / extremeW
2530 scaleA = 500 / extremeA
2540 IF cycleind% THEN
2550 MOVE recordW(R%)*scaleW,recordA(R%)*scaleA
2560 FOR r%=1 TO 3199
2570 subs%=(R%+r%) MOD 3200
2580 DRAW recordW(subs%)*scaleW,recordA(subs%)*scaleA
2590 NEXT
2600 ELSE
2610 MOVE 0,0
2620 FOR r%=1 TO R%-1
2630 DRAW recordW(r%)*scaleW,recordA(r%)*scaleA
2640 NEXT
2650 ENDIF
2660 PRINT TAB(0,31);inflow;
2670 ENDPROC
2680 :
2690 DATA 0,1
2700 DATA 0.7071,0.7071
2710 DATA 1,0
2720 DATA 0.7071,-0.7071
2730 DATA 0,-1
2740 DATA -0.7071,-0.7071
2750 DATA -1,0
2760 DATA -0.7071,0.7071
```

Listing 10 - GCOL8

```
10 REM >GCOL8 (Info10)
20 REM by Dave Acton
30 REM for all machines
40 REM (c) BAU September 1992
50 :
60 MODE 1
70 FOR code%=0 TO 3
80 CLS
90 READ type$
100 PRINT"GCOL ";code%;",X ("type$")"
110 FOR i%=0 TO 3
120 FOR j%=0 TO 3
130 PRINTTAB(12+5*i%,4);i%
140 PRINTTAB(8,8+5*j%);j%
150 x%=640+160*(i%-1.5)
160 y%=512+160*(1.5-j%)
170 GCOL 0,i%
180 MOVE x%-50,y%-50
190 PLOT 0,100,0
200 PLOT 81,-100,100
210 PLOT 81,100,0
220 GCOL code%,j%
230 MOVE x%-30,y%-30
240 PLOT 0,60,0
250 PLOT 81,-30,60
260 NEXT
270 NEXT
280 key=GET
290 NEXT
300 END
310 :
320 DATA Set,OR,AND,EOR
```

Listing 11 - GCOL32

```
10 REM >GCOL32 (Info11)
20 REM by Dave Acton
30 REM for 32-bit only
40 REM (c) BAU September 1992
50 :
60 MODE 1
70 FOR code%=0 TO 3
80 CLS
90 READ type$
100 PRINT"GCOL ";code%;",X ("type$")"
110 FOR i%=0 TO 3
120 FOR j%=0 TO 3
130 PRINTTAB(12+5*i%,4);i%
140 PRINTTAB(8,8+5*j%);j%
150 x%=640+160*(i%-1.5)
160 y%=512+160*(1.5-j%)
170 GCOL i%
180 RECTANGLE FILL x%-50,y%-50,100,100
190 GCOL code%,j%
200 CIRCLE FILL x%,y%,30
210 NEXT
220 NEXT
230 key=GET
240 NEXT
250 END
260 :
270 DATA Set,OR,AND,EOR
```

Listing 12 - CDWords

```
10 REM >CDwords (Info12)
20 REM by Tony Dibble
30 REM for 8-bit machines + SpellMaster
40 REM (C) BAU September 1992
50 :
60 MODE 3
70 PROCinit
80 PROCcode
90 REPEAT
100 PROCgetletters
110 PROCsearch
120 UNTIL FALSE
130 END
140 :
150 DEF PROCinit
160 smslot=7
170 REM issue 1.67
180 sminit=&928C:smnext=&9862
190 REM issue 1.69
200 sminit=&9273:smnext=&98AC
210 ENDPROC
220 :
230 DEF PROCgetletters
240 VDU 26,12
250 PRINT"Enter nine letters : ";
260 l$=""
270 REPEAT
280 c$=GET$
290 IF c$>="a" AND c$<="z" c$=CHR$(ASCc$-32)
300 IF c$>="A" AND c$<="Z" AND LENl$<9 l$=l$+c$:PRINT c$;
310 IF c$=CHR$127 VDU 127:l$=LEFT$(l$,LENl$-1)
320 UNTIL c$=CHR$13 AND LENl$=9
330 ENDPROC
340 :
350 DEF PROCsearch
360 xpos=0
370 FOR letters=9 TO 3 STEP -1
380 VDU 28,xpos,24,79,2
390 PRINT;letters
400 VDU 28,xpos,24,79,3
410 ?len=letters-2
420 FOR i=1 TO 9
430 FOR j=1 TO 9
440 IF FNdifferent(i,j) PROCpick(i,j)
450 NEXT
460 NEXT
470 xpos=xpos+letters+6
480 NEXT
490 *FX15,0
500 IFGET
510 ENDPROC
520 :
530 DEF FNdifferent(a,b)
540 IF a=b THEN =FALSE
550 a$=MID$(l$,a,1)
```

```
560 b$=MID$(1$,b,1)
570 a2=INSTR(1$,a$)
580 b2=INSTR(1$,b$)
590 =((a=a2) AND (b=b2))
600 :
610 DEF PROCpick(a,b)
620 a$=MID$(1$,a,1)
630 b$=MID$(1$,b,1)
640 m$=a$+b$
650 FOR l=1 TO 9
660 IF l<>a AND l<>b m$=m$+MID$(1$,1,1
)
670 NEXT
680 $word=m$
690 CALL pick
700 ENDPROC
710 :
720 DEF PROCcode
730 oswrch=&FFEE
740 osnewl=&FFE7
750 DIM code 500
760 FOR pass=0 TO 2 STEP 2
770 P%=code
780 [OPT pass
790 .pick
800 JSR setup
810 JSR init
820 BCS pend
830 .pickloop
840 JSR smnext
850 BCS pend
860 LDA &66
870 CMP len
880 BNE pickloop
890 LDY #7
900 .cbloop
910 LDA word+2,Y
920 STA cb,Y
930 DEY
940 BPL cbloop
950 INY
960 .nextloop
970 LDX #0
980 .nomatch
990 LDA &632,Y
1000 CMP cb,X
1010 BEQ match
1020 INX
1030 CPX #8
1040 BEQ pickloop
1050 BNE nomatch
1060 .pend
1070 JSR setdown
1080 RTS
1090 :
1100 .match
1110 LDA #0
1120 STA cb,X
1130 INY
1140 CPY &66
1150 BNE nextloop
1160 LDA word
1170 JSR oswrch
1180 LDA word+1
1190 JSR oswrch
1200 LDY #0
1210 .printword
1220 LDA &632,Y
1230 JSR oswrch
1240 INY
1250 CPY &66
1260 BNE printword
1270 JSR osnewl
1280 JMP pickloop
1290 :
1300 .setup
1310 LDA &F4
1320 STA rom
1330 LDA #smslot
1340 STA &F4
1350 STA &FE30
1360 LDX #&26
1370 .savezero
1380 LDA &60,X
1390 STA sixty,X
1400 DEX
1410 BPL savezero
1420 LDA &BFE0
1430 LDA word
1440 STA &69
1450 LDA word+1
1460 STA &6A
1470 RTS
1480 :
1490 .setdown
1500 LDX #&26
1510 .loadzero
1520 LDA sixty,X
1530 STA &60,X
1540 DEX
1550 BPL loadzero
1560 LDA rom
1570 STA &F4
1580 STA &FE30
1590 RTS
1600 :
1610 .init
1620 LDA #&20
1630 STA &63
1640 LDA #6
1650 STA &64
1660 LDA #0
1670 STA &68
1680 JMP sminit
1690 :
1700 .rom
1710 BRK
1720 .sixty
1730 EQUS STRING$(40," ")
1740 .word
1750 EQUS STRING$(10," ")
1760 .cb
1770 EQUS STRING$(10," ")
1780 .len
1790 NOP
1800 ]:NEXT
1810 ENDPROC
```

Listing 13 - Challenge

```
10 REM >Challenge (Info13)
20 REM Maze challenge
30 REM by DCA
40 REM for all machines
50 REM (c) BAU September 1992
60 :
70 seed%=-123
80 xor%=&1D872B41
90 IF HIMEM>&10000 THEN MODE 1:sq%=32
 ELSE MODE 5:sq%=64
100 size%=15
110 mid%=(size%-1)/2
120 DIM b%(7),maze%(size%-1,size%-1),s
earch%(size%-1,size%-1),dx%(3),dy%(3)
130 FOR i%=0 TO 3
140 READ dx%(i%),dy%(i%)
150 NEXT
160 PROCmake_chars
170 max_moves%=1000
180 PROCsolve_setup
190 total_solved%=0
200 total_moves%=0
210 FOR maze%=1 TO 10
220 CLS
230 PRINT"Maze: ";maze%
240 PROCbuildmaze(maze%,FNrnd(2)=1)
250 PROCsolve_newmaze
260 moves%=0
270 manx%=mid%
280 many%=mid%
290 amuletx%=FNrnd(size%)-1
300 amulety%=(size%-1)*(FNrnd(2)-1)
310 IF FNrnd(2)=1 temp%=amuletx%:amule
tx%=amulety%:amulety%=temp%
320 PROCshow(amuletx%,amulety%,1)
330 PROCshow(manx%,many%,2)
340 TIME=0
350 REPEAT
360 PRINTTAB(0,2)"Moves=";moves%
370 moves%=moves%+1
380 oldx%=manx%
390 oldy%=many%
400 move_dir%=FNwhichway
410 IF NOT FNwall(move_dir%) THEN manx
%=manx%+dx%(move_dir%):many%=many%+dy%(m
ove_dir%)
420 PROCshow(oldx%,oldy%,0)
430 PROCshow(manx%,many%,2)
440 UNTIL moves%=max_moves% OR (manx%=
amuletx% AND many%=amulety%)
450 IF TIME>120000 PRINTTAB(0,25)"Time
 up":STOP
460 IF manx%=amuletx% AND many%=amulet
y% THEN total_solved%=total_solved%+1:to
tal_moves%=total_moves%+moves%
470 NEXT
480 PRINTTAB(0,25)"Mazes solved=";tota
l_solved%
490 PRINT"Total moves=";total_moves%
500 END
510 :
520 DEF PROCmake_chars
530 FOR i%=0 TO 15
540 FOR j%=0 TO 7
550 b%(j%)=0
560 NEXT
570 IF (i% AND 1) THEN FOR j%=0 TO 7:b
%(j%)=1:NEXT
580 IF (i% AND 2) THEN b%(7)=255
590 IF (i% AND 4) THEN FOR j%=0 TO 7:b
%(j%)=b%(j%) OR 128:NEXT
600 IF (i% AND 8) THEN b%(0)=255
610 VDU 23,224+i%
620 FOR j%=0 TO 7
630 VDU b%(j%)
640 NEXT
650 NEXT
660 VDU 23,255,0,24,60,126,126,60,24,0
670 ENDPROC
680 :
690 DEF PROCshow(x%,y%,c%)
700 VDU 5
710 GCOL 0,c%
720 MOVE sq%*x%,1020-32*(y%+5)
730 VDU 255,4
740 ENDPROC
750 :
760 DEF PROCbuildmaze(maze%,open%)
770 FOR x%=0 TO size%-1
780 FOR y%=0 TO size%-1
790 maze%(x%,y%)=15
800 NEXT
810 NEXT
820 left_to_do%=size%*size%
830 PROCdoor(mid%,mid%,FNrnd(4)-1)
840 xx%=FNrnd(size%)-1
850 yy%=FNrnd(size%)-1
860 REPEAT
870 REPEAT
880 xx%=(xx%+1) MOD size%
890 IF xx%=0 yy%=(yy%+1) MOD size%
900 UNTIL maze%(xx%,yy%)<>15 AND maze%
(xx%,yy%)<>0 AND (FNok(xx%+1,yy%) OR FNo
k(xx%-1,yy%) OR FNok(xx%,yy%-1) OR FNok(
xx%,yy%+1))
910 x%=xx%
920 y%=yy%
930 REPEAT
940 try%=0
950 REPEAT
960 try%=try%+1
970 REPEAT
980 dir%=FNrnd(4)-1
990 UNTIL maze%(x%,y%) AND (2^dir%)
1000 nx%=x%+dx%(dir%)
1010 ny%=y%+dy%(dir%)
1020 ok%=nx%>=0 AND nx%<size% AND ny%>=
0 AND ny%<size%
1030 IF ok% THEN ok%=maze%(nx%,ny%)=15
1040 UNTIL ok% OR try%=4
1050 IF ok% PROCdoor(x%,y%,dir%)
1060 x%=nx%
1070 y%=ny%
1080 UNTIL NOT ok%
1090 UNTIL left_to_do%=0
1100 IF NOT open% ENDPROC
1110 FOR i%=1 TO 25
1120 PROCdoor(FNrnd(size%-2),FNrnd(size
%-2),FNrnd(4)-1)
1130 NEXT
1140 ENDPROC
1150 :
1160 DEF FNok(x%,y%)
1170 IF x%=-1 OR x%=size% OR y%=-1 OR y
%=size% THEN =FALSE
1180 =maze%(x%,y%)=15
1190 :
1200 DEF PROCdoor(x%,y%,dir%)
1210 PROCknock(x%,y%,dir%)
1220 PROCknock(x%+dx%(dir%),y%+dy%(dir%
),dir% EOR 2)
1230 ENDPROC
1240 :
1250 DEF PROCknock(x%,y%,dir%)
1260 IF maze%(x%,y%)=15 left_to_do%=lef
t_to_do%-1
1270 maze%(x%,y%)=maze%(x%,y%) AND NOT
(2^dir%)
1280 PROCshowcell(x%,y%)
1290 ENDPROC
1300 :
1310 DEF PROCshowcell(x%,y%)
1320 VDU 31,x%,5+y%,224+maze%(x%,y%)
1330 ENDPROC
1340 :
1350 DEF FNwall(dir%)=(maze%(manx%,many
%) AND (2^dir%))>0
1360 :
1370 DEF FNrnd(range%)
1380 LOCAL i%,r%
1390 r%=range%
1400 REPEAT
1410 IF seed% AND 1 THEN seed%=(seed%/2
) EOR xor% ELSE seed%=seed%/2
1420 r%=r%/2
1430 UNTIL r%=0
1440 =1+(seed% AND &FFFF) MOD range%
1450 :
1460 DATA 1,0,0,1,-1,0,0,-1
1470 :
1480 REM Append "Follow", or your own
routines here...
```

Listing 14 - Follow

```
10 REM >Follow Info14
20 :
30 DEF PROCsolve_setup
40 ENDPROC
50 :
60 DEF PROCsolve_newmaze
70 mdir%=RND(4)-1
80 ENDPROC
90 :
100 DEF FNwhichway
110 LOCAL d%
120 d%=mdir%-2
130 REPEAT
140  d%=(d%+1) AND 3
150 UNTIL NOT FNwall(d%)
160 mdir%=d%
170 =mdir%
```

Arm Programming

Listing 1

```
10 REM >ARM1
20 REM By Dave Lawrence
30 REM For 32 bit machines
40 REM (C) BAU September 1992
50 :
60 DIM code 100
70 link=14
80 pc=15
90 FOR pass=0 TO 2 STEP 2
100 P%=code
110 [OPT pass
120 .add     ADD     R0,R0,R1
130          MOV     pc,link
140 ]NEXT
150 REPEAT
160  INPUT "Please enter two numbers (
x,y) : "x,y
170  PRINT "x+y=";x+y;" (from Basic)"
180  A%=x:B%=y
190  PRINT "x+y=";USR(add);" (from ARM
)"'
200
210 UNTIL FALSE
```

Listing 2

```
10 REM >ARM2
20 REM By Dave Lawrence
30 REM For 32 bit machines
40 REM (C) BAU September 1992
50 :
60 DIM code 100
70 link=14
80 pc=15
90 FOR pass=0 TO 2 STEP 2
100 P%=code
110 [OPT pass
120 .factorial
130          CMP     R0,#0
140          BEQ     fact_done
150          MOV     R1,#1
160 .fact_loop
170          MUL     R1,R0,R1
180          SUBS    R0,R0,#1
190          BNE     fact_loop
200
210          MOV     R0,R1
220 .fact_done
230          MOV     pc,link
240 ]NEXT
250 REPEAT
260  INPUT "Please enter a number : "x
270  A%=x
280  PRINTx;"! = ";USR(factorial)
290 UNTIL FALSE
```

Listing 3

```
10 REM >ARM3
20 REM By Dave Lawrence
30 REM For 32 bit machines
40 REM (C) BAU September 1992
50 :
60 DIM code 100
70 link=14
80 pc=15
90 FOR pass=0 TO 2 STEP 2
100 P%=code
110 [OPT pass
120 .loaddemo
130          LDR     R0,memory
140          MOV     pc,link
150
160 .memory EQUD    &123456
170 ]NEXT
180 PRINT ~!memory
190 PRINT ~USR(loaddemo)
```

Listing 4

```
10 REM >ARM4
20 REM By Dave Lawrence
30 REM For 32 bit machines
40 REM (C) BAU September 1992
50 :
60 DIM code 100
70 link=14
80 pc=15
90 FOR pass=0 TO 2 STEP 2
100 P%=code
110 [OPT pass
120 .storedemo
130          LDR     R1,total
140          ADD     R1,R1,R0
150          STR     R1,total
160
170          MOV     pc,link
180
190 .total  EQUD    0
200 ]NEXT
210 REPEAT
220  PRINT'"Total = ";!total
230  INPUT "Score : "score
240  A%=score
250  CALL storedemo
260 UNTIL FALSE
```

Listing 5

```
10 REM >ARM5
20 REM By Dave Lawrence
30 REM For 32 bit machines
40 REM (C) BAU September 1992
50 :
60 DIM code 100
70 link=14
80 pc=15
90 FOR pass=0 TO 2 STEP 2
100 P%=code
110 [OPT pass
120 .load
130          MOV     R1,#&10000
140          LDR     R0,[R1]
150
160          MOV     pc,link
170 ]NEXT
180 !&10000=RND(10000)
190 PRINT !&10000,USR(load)
```

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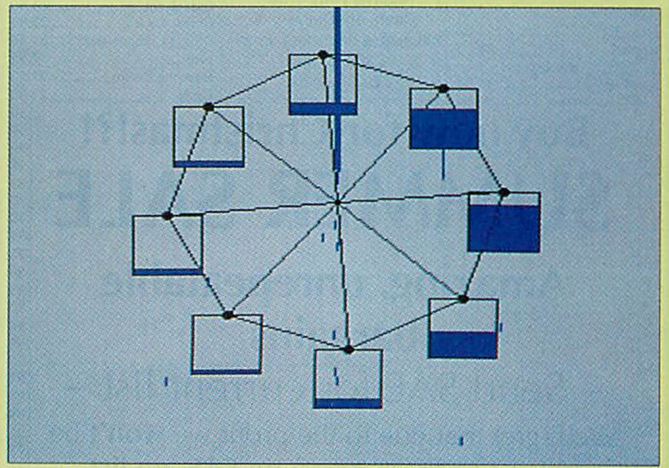


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Is MDI's CD-Rom, Dictionary of the Living World, the product that will unleash the potential of multimedia on the Arc? Fin Fahey goes for a stroll around the zoo cages

The Dictionary of the Living World, from Media Design Interactive, is the first of its kind. It is, at root, a dictionary of biological terms, but what makes it different is the inclusion of full-motion video clips, still shots and sound samples.

DOLW is a single CD-Rom and it comes in some very pretty packaging. You can tell straight away that it's intended to be easy to use, since it has the tiniest user manual I've seen in a long time – four A5 sides. This contains just enough information to get you started: the package also supports Acorn Interactive Help. There should be no great need for it though, since the system is largely self-explanatory and contains its own help screens.

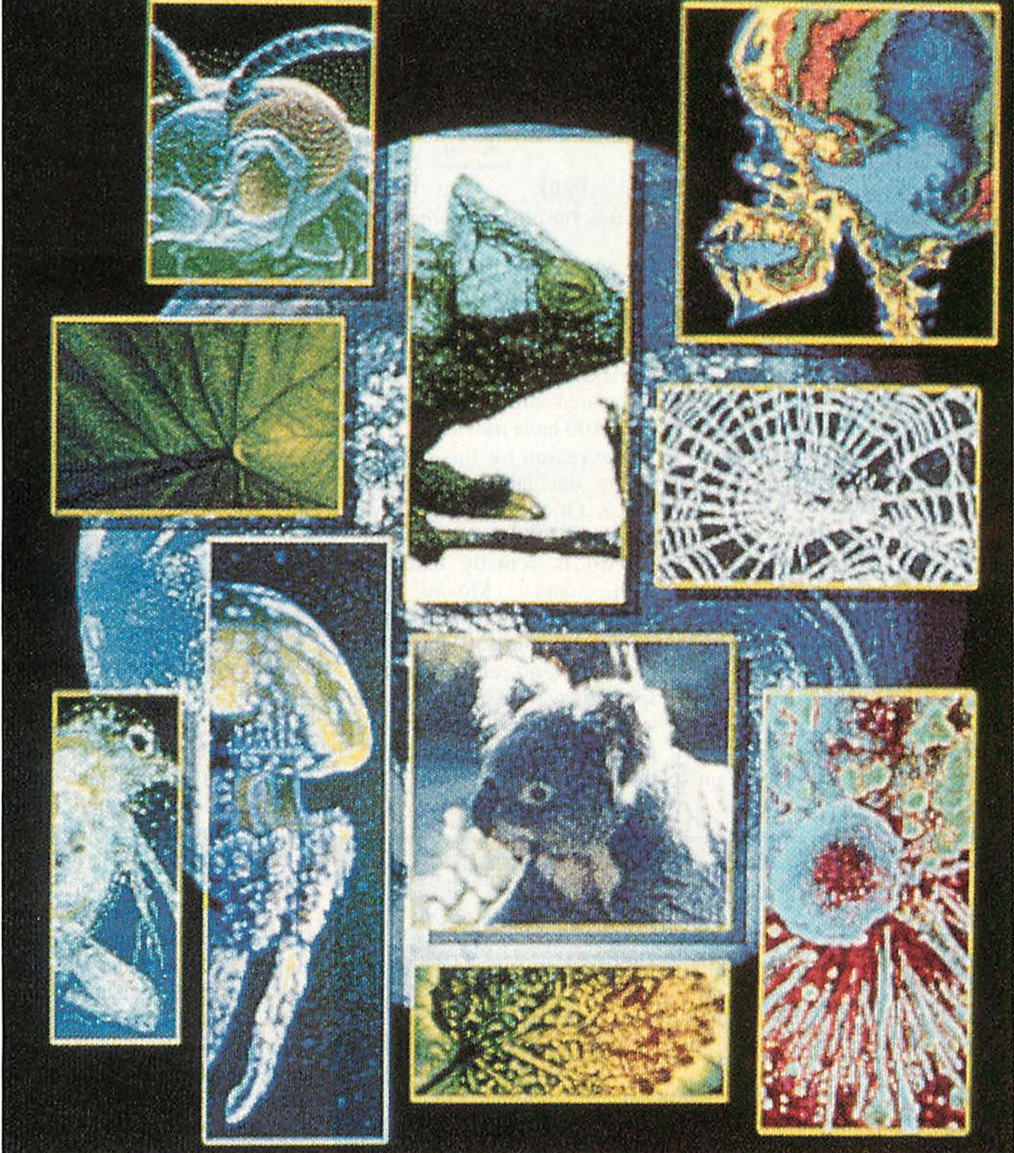
The place to go, and to centre on, once the main options screen has loaded is the Main Index. This is a simple scrolling listing of all the terms included in the dictionary with an optional sub-title (for example a Latin name) and icons showing the presence of a picture, map, sound or movie.

GETTING AROUND

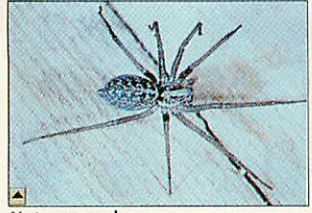
DOLW's entries cover a large range of life-science categories, from biochemistry and botany to specific animals. Obviously sounds and images are associated mostly with the latter. Clicking on a text entry brings up the associated screen, with a scrollable window of text, and a picture, if there is one.

These screens can also be accessed from the main index using the Search Results Index. This compiles a sub-set of the main index which you can select on the basis of keywords in the entry. Up to three keywords can be entered, so you could, for example, pull out everything containing 'fish' and 'coral reef'. You can also specify that you only want entries with pictures, movies, sound or maps.

Besides access from the main index, there are video buttons on the entries themselves. These allow you to go to the beginning or end of the main or search indexes, or look at the next or previous entry. There are also icons



Dictionary of the Living World features more than 2600 species



Not so popular . . .

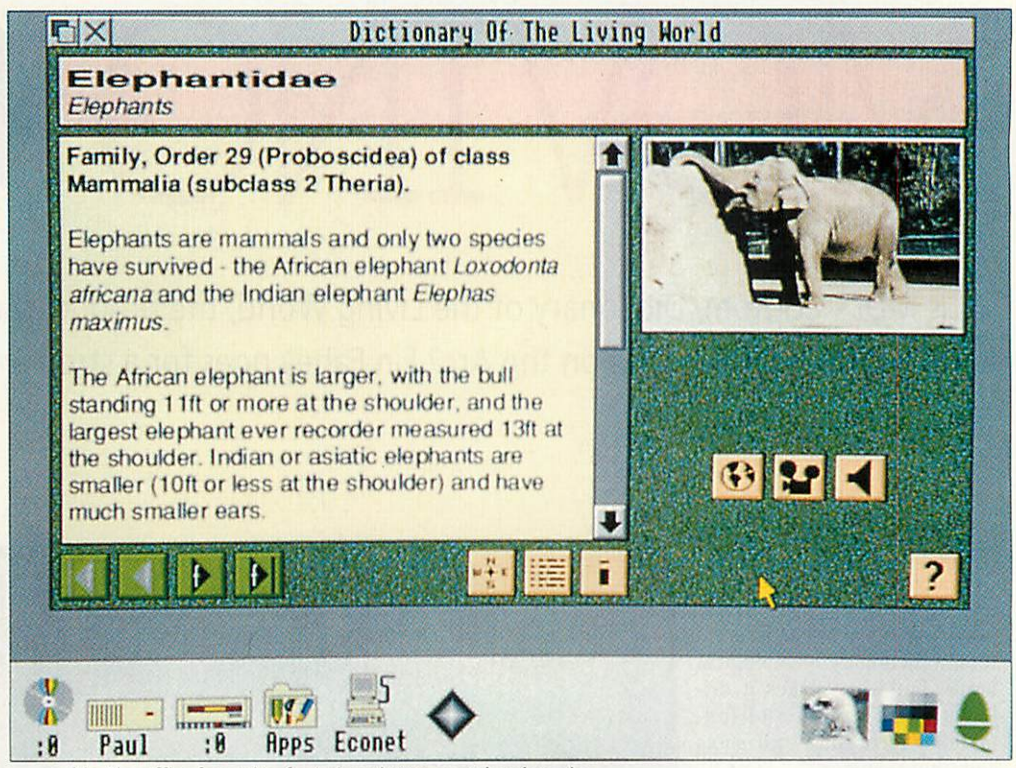
which will, if not greyed out, display maps, movies or play sounds. It is possible to blow up a picture so that it covers the full screen by clicking on it. The help icon, available both on entries and on the index screens, shows a diagram of the current screen explaining exactly what each button does.

Movies, when selected, have their own set of video buttons, which allow the user to pause, step through frame by frame, stop or turn the sound on/off (movies may have associated sound tracks different from the usual sound samples).

The Menu button is also operational. On the icon bar it allows you to turn the main *DOLW* window on or off, or to change the sound volume. When clicked on a dictionary entry, it allows the user to export (extract) any of the information from an entry for their own use, right down to an individual movie frame, or a sound.

THE SYSTEM

That's how it works, but what does *DOLW* offer the regular Arc user? It sounds attractive enough, and it certainly is easy to use, which should appeal to anyone interested in its educational uses. However, in my opinion there is an certain shallowness to the package.



. . . as this. The office favourite, featuring picture, sound and movie

For a start, this is really a text-based system with a few graphics and sounds tagged on on top. Of the 2600 odd entries, only 256 of them have associated still pictures and a mere 100 have movies.

The reason for this selectivity is not lack of CD-Rom space. Of the whole 600+Mb on the CD-Rom, only some 350Mb is actually taken up with data. Movies are memory-hungry. The existing movies take up 150Mb of this, but there's no real shortage of space. If we forget movies, the situation looks worse – the pictures take up about 54Mb, the maps 39Mb, sound 97Mb and the text only 1Mb.



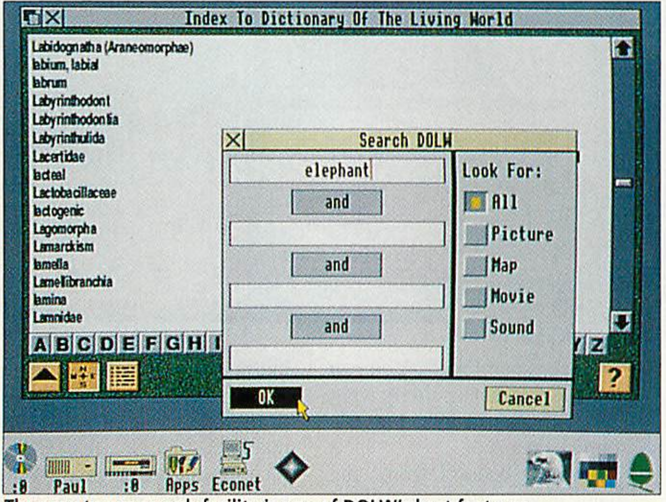
Much of the film footage was clearly taken at the zoo

Pictures are stored with no data compression, and the full-screen and small-screen versions are both stored. The sound samples are stored in three different forms: relocatable sound samples, raw samples and Acorn *Replay* files. Is this padding, or do the authors assume that a 'power' Arc user will not have any capacity to cross-convert?

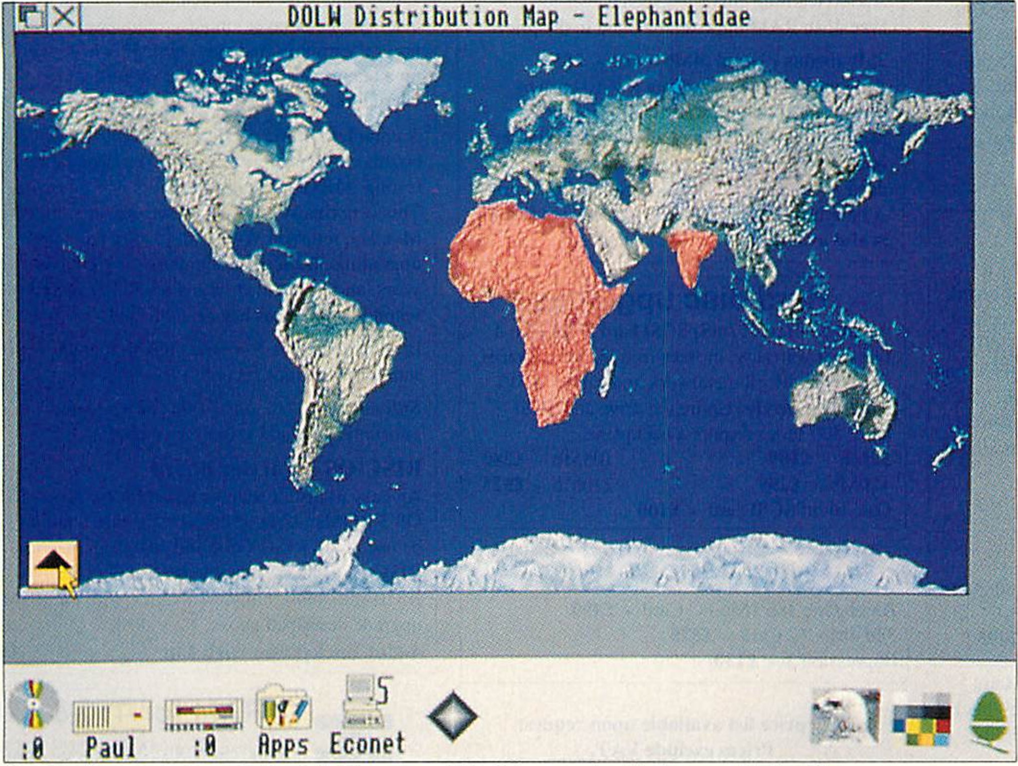
Each of the maps, which show the global distribution of species, displays a very attractive full colour world chart, with the area of distribution of a species outlined in red. Rather than do the obvious and store one set of map graphics, with only the distribution data held for each species, *DOLW* stores the whole map every single time – at a rough estimate that 39Mb should only take up about 2Mb.

All of this is understandable in the Mac or PC markets. MDI, or any other CD-Rom supplier, has every right to play fast and loose with the megabytes – CD-Roms are B - I - G and offering graphics and like, wow, sound, means that PC users, in particular, will be suitably gobsmacked. But, in our market I feel the point is crucial, since it bears on the issue of what reason a 32-bit user may find for buying *DOLW*.

There should be a good reason for shelling out nearly £200 on a CD-Rom – expensive, even by CD-Rom standards. Either: it offers such a comprehensive volume of data that the equivalent printed



The easy-to-use search facility is one of DOLW's best features



An attractive map but . . . elephants in Morocco and the Sahara, and not in Burma or Thailand?


Behind bars . . . natural habitats rarely feature here

matter would be unwieldy (the *Oxford English Dictionary* comes into this category); or it uses the unique nature of the medium to present information in an interesting and creative way (for example, hypertext). Or, of course, both.

DOLW offers nothing, bar a search facility, that wouldn't be better covered by books and videos at a fifth of the price. True, it makes no claim to be comprehensive, which is fortunate, because it isn't. At the text level, besides the 'wildlife movie' aspect, it attempts to cover other aspects of the life sciences, such as genetics, physiology and biochemistry. It was in vain, however, that I searched for entries on such common terms as 'immunoglobulin', 'T-cell', 'oncogene' or 'intron'.

Calling yourself a *dictionary* implies that you are both comprehensive and authoritative. This is neither. I would understand, if the package had sacrificed text space (1Mb!) to graphics. But it hasn't. Incidentally, in any sort of pictorial dictionary, the use of diagrams would have helped, especially in 'difficult' areas like biochemistry.

I was also puzzled by the strange selectivity of the images on the disc. The first thing everyone will turn to is the movie option. A swift poll in the *BAU* office revealed that the most popular creatures were dolphin, whales, elephants and sharks. Of these, only the elephant was available in motion – the others didn't even have still shots.

Examining the images raised another suspicion. Has someone simply trundled down to the local zoo and grabbed video shots of whatever was lying around? For sheer spectacle, it's hard to match the movie of the aardwolf – the animal is fast asleep, but you can tell this is a movie because the vegetation moves. The iguana is equally enthralling. After waiting several seconds, you are treated to an eyeblink.

It's clear that this package is not the CD-Rom equivalent of *Life on Earth.* Was it really necessary to blow disc space on a still picture of *melopsittacus undulatus* since, I think, we all know what a common budgie looks like?

Neither can these shortcomings be justified by references to multimedia. Hypertext this isn't. There is none of the rich interconnection of terms that can lead you around a hypertext system, discovering more all the time. This is just like a printed book with a computer search facility.

And why order information this way? Why are the primary entries for some species – for example, Impala and Mallard – their Latin names, whereas for others English comes first? Why didn't the system use a heirarchic indexing based on taxonomy, which would have at least rooted the entries in a comon knowledge base.

CONCLUSION

In all fairness, the faults I have described are not uncommon in the Mac and PC market, at present – this package has received at least two awards when issued on these platforms. Unfortunately, we Arc users have to demand more, mostly because we're already used to better graphics and sound than the average Mac or PC user.

But I also feel that Arc users, many of them involved in education, will want more sustained value for their £175. It's difficult to see where this package might fit into the educational market. Primary school children will like some of the images, but there's no way that teachers can base any project work on the system. Secondary schools will find its lack of comprehensiveness irritating. In the current climate, there have to be better uses for the cash. Home users – say no more!

For the price of this CD-Rom, you can pop down to a bookshop and acquire a whole shelf of life science books. So the pictures don't move and there's no sound? Throw in a few of the BBC's excellent *Life on Earth* videos – they have great sound tracks too.

PRODUCT DETAILS

Product: Dictionary of the Living World
Supplier: Optech
Tel: (0252) 714340
Price: £175 exc VAT. 10% educational discount

SHORT SHARP SCSI

When it comes down to it, what we all want is more megabytes. Richard Garrett looks at the the SCSI solution

Nowadays, it takes scarcely a glance at the advertisements in this or any other microcomputing magazine to see that, once you've got a computer and, maybe, a printer, the next thing hardware companies want you to buy is extra storage. It's official – what everyone wants is more megabytes!

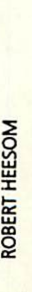
You can barely turn a page without being faced by arcane descriptions of hard discs, flopticals and so on, each one a maze of megabytes and milliseconds and strange abbreviations that, on first reading, leave hapless customers confused as to what they should spend their money on. We, here at *BAU,* like to help people spend their money, so the aim of this article is to clear up some of the jargon by looking at data access using SCSI, and at some the devices available.

IT'S HISTORY

In 1982, faced with an ever increasing variety of computers and an even greater number of disc drives, the American National Standards Institute (ANSI) decided to develop a standard that would; 'facilitate the integration of physically small computers and intelligent peripheral devices, particularly storage devices, into computer systems'. What they came up with was the ANSI Small Computer Systems Interface (pronounced 'scuzzy').

SCSI is a protocol by which computers communicate with other devices over moderate distances (up to 25m), at moderate speeds (up to 4Mb per second). SCSI is 'device independent', that is, the internal workings of each device (for example, the number of heads, cylinders, and sectors on a Winchester) are hidden from the interface.

Hence the computer uses one 'generic' driver to send information to all devices of a given type rather than different software for every model on the market (as with printers).



Although the original specification was for magnetic discs, it has grown to include other optional devices (tape, printers, processors optical discs and so on).

Once defined, SCSI was particularly attractive to the makers of external hard drives because they could market products for numerous different computers without designing a variant for each one. Most microcomputer manufacturers, however, felt that their customers didn't need that much hard disc space, and made their own 'machine-specific' designs at reduced cost. Principal exceptions were suppliers of workstations, who knew their customers would require SCSI expandability, and Apple, who didn't care what their computers cost. This state of affairs remained until recent explosions in networking and CD-Rom use caused a boom demand for cheap, fast data transfer on a number of platforms. (see box below).

WHAT IS IT?

Physically, SCSI takes the form of a computer, called the 'initiator', connected by 50-way cable to a maximum of seven 'target' devices (numbered 0 to 6) in a 'daisychain' with a bunch of resistors at each end called 'terminators' (no relation to Arnold). Device number 7 is always a controller card in the main computer which translates instructions from the operating system into standard SCSI codes, and vice versa. If seven peripherals aren't enough, there are optional 'extended messages' which allow up to 2048 peripherals on each target. However, although SCSI is fast, only two devices on a bus can communicate at one time so, when you run out of sockets, it's more usual to buy a second controller.

PICK A CARD

The first thing you need to run SCSI on an Acorn computer is a controller card. There are several on the market and, from the user's perspective, they all do much the same thing. Non-A3000 controllers come on single width expansion cards fitted with a 50-way 'internal' IDC and an IDC or a Centronics socket for external devices (Centronics is the more common one of the two).

On the A3000, most of these cards are available in boxes for use with the external podule socket, but there are also internal versions (Vertical Twist, Serial Port); an eight-bit SCSI podule with a user port on it (Technomatic); and 45Mb and 100Mb external 'hard cards' (HCCS).

Each card comes with a ROM-based SCSI filing system. The ones we looked at all connected to the RiscOs FileCore to become almost indistinguishable from the rest of the operating system. In normal use, the only apparent difference is that disc filenames start with 'scsi:' instead of 'adfs:'. FileCore supports up to four Winchesters like this and these appear as scsi::4 to scsi::7. The remaining 'slots' on the SCSI bus can be used with other device types.

Design differences between SCSI cards occur in the methods used to transfer data from card to processor. Some cards use additional electronics to convert eight-bit bytes into 16-bit words before sending them to the Arm, thereby making transfer more efficient. Others feature 'cache' memory that allows the card to store information from the disc and send it in large chunks (for example 2K at a go on the Morley card) rather than sending it a few bytes at a time. This is particularly effective if the card is designed only to interrupt the processor when it has chunks of data to send or receive.

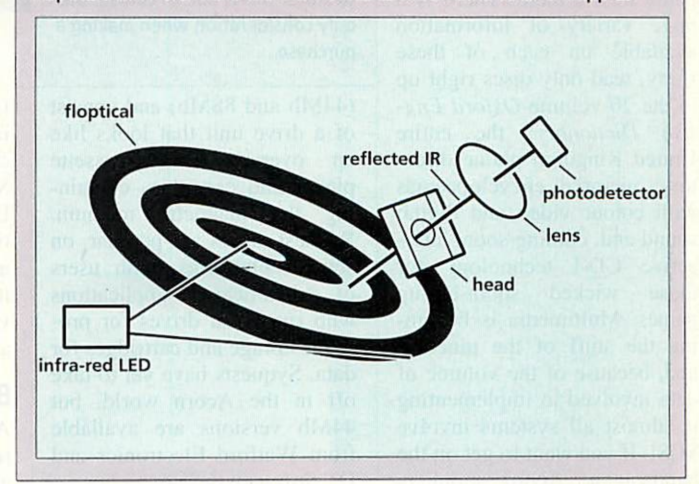
It is difficult to make absolute judgements when choosing SCSI cards. Different manufacturers quote 'transfer speeds', but there seems to be no well-defined way to calculate them. Connecting two controllers 'back to back', say, produces results which, while impressive, are irrelevant to hard disc users. Generally, the speeds at which drives transfer data are low in comparison to the bus specification (a 40Mb unit may average 700Kbs) and quite within the range of most available cards.

If you really want to know about transfer speeds, you should ask manufacturers how their cards perform with the particular devices you plan to use. Price differences arise largely from questions like 'is this an eight or 16 bit card?'; 'does it have a cache?' and 'does it support other devices as well as fixed discs?'. If cost is your concern, most cards are significantly cheaper when 'bundled' with a device.

FLOPTICALS

The factor that limits the capacity of conventional floppy discs is neither the density of the magnetic material nor the width of the read head. The number of tracks you can squeeze on the disc depends on the accuracy of the head motor. Current drives use 'dumb' technology which, when told to locate track 23, moves the head to wherever track 0 ought to be and then takes 23 'steps' across the disc to where track 23 should be. If the drive is misaligned or the disc less than circular, this may not be the same place that track 23 was in when you last looked.

Floptical drives increase storage by introducing a feedback loop. Each floptical disc has concentric grooves ('servo tracks') stamped into it that run parallel to the magnetic tracks. The disc is illuminated in infra-red light, and a photodetector is used to spot changes in IR reflectivity as the head crosses a groove. By counting grooves, the head can locate a track accurately. Add a new barium ferrite coating for the diskette, and flopticals can hold more than ten times as much data as 2HD floppies.



SCSI AND THE BIG MAC

Apple Computers took to SCSI very quickly and has been fitting ports on all its hard drive models for years. This, combined with Apple's strict pricing policy on the machines themselves and the Mac's popularity in areas that demand a lot of storage (for example, publishing and graphic design) has led to a very competitive market in SCSI peripherals. In Mac journals, you'll find internal and external Winchesters on offer that range in size from 30Mb to 2Gb (gigabytes) and in price from about £120 to £3500. Syquest drives are common, particularly among the digital music fraternity (88Mb means nine minutes of stereo samples).

There are a large number of Hypercard CD-Rom discs available on the Mac and the price of drives is still dropping, but until some entrepreneur writes Hypercard interpreters for other platforms, most of the data will unfortunately be restricted to Macs. Other SCSI devices used in the Mac world are flopticals, magneto-opticals, WORMs, tape units, and scanners. You occasionally see a laser printer with SCSI, but it's more likely to be used for font storage on hard disc than as a 'super fast' printer cable.

In the past, most IBM PC users made do with one internal hard drive, and the SCSI market remained small. A number of things have happened recently to change this. They include the arrival of much larger Windows 3 programs; the development of 'single chip upgradable' PCs; a huge level of corporate interest in Novell networks; and the emergent multimedia standard (MPC). It seems that everybody now wants SCSI, whether for CD-Rom, for DAT backups, or just for more Winchesters on their network server.

This is good news for Acorn users because, as long as your SCSI system supports the device type you want to use, Mac and PC devices should work as well as those sold by Acorn manufacturers.

Fixed magnetic hard discs are, by far, the most common SCSI peripherals and, because of the machines upon which SCSI has been popular to date, external drives (up to 2Gb) are probably more successful than internal. Now, let's look at some of the other things you can do with a SCSI card.

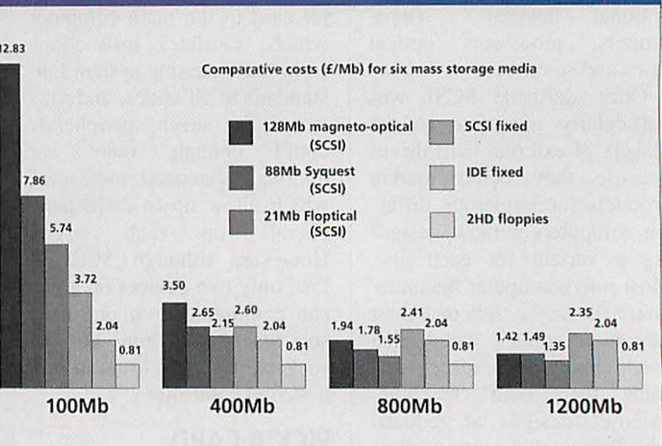
Probably the commonest SCSI devices after Winchesters, CD-Rom drives are turning up everywhere: schools, libraries, offices, you name it, it's there. There is a huge variety of information available on each of these shiny, read-only discs right up to the 20-volume *Oxford English Dictionary*; the entire United Kingdom phone directory; pictorial encyclopaedias with colour video and digital sound and, coming soon, interactive CD-I technology for those wicked shoot-em-up games. Multimedia is becoming the stuff of the nineties, and, because of the volume of data involved in implementing it, almost all systems involve SCSI. If you want to get on the bandwagon, Acorn suppliers of CD-Rom drives include Oak Solutions and Cumana.

Removable hard discs, known as 'Syquest' drives, after their most successful manufacturer, come in two mutually incompatible sizes (44Mb and 88Mb) and consist of a drive unit that looks like an oversized car cassette player and cartridges containing the magnetic medium. Syquest drives are popular, on several platforms, with users of 'data-heavy' applications who run fixed drives for program storage and cartridges for data. Syquests have yet to take off in the Acorn world, but 44Mb versions are available from Watford Electronics and DT Software.

21Mb floptical drives (Morley, Serial Port) are also appearing on the horizon but it's unclear yet whether they count as removable hard disc or as the 'superfloppies' of the future. (see box on flopticals).

QUIDS PER MEGABYTE

It's conventional to calculate storage costs like this: magneto-optical discs costs £49 and hold 128Mb, therefore divide 49 by 128 and you get a cost of 38 pence a megabyte – which is dead cheap. In fact, if you add £1100 into the calculation for the initial cost of the drive, you find that you need about 2Gb of storage before you even approach that price. The graph shows how the actual cost of storage is dependent upon the amount you want to store. This is not, of course, the only consideration when making a purchase.



THE IDE OPTION

IDE (In full, IDE – ATA, which stands for Integrated Drive Electronics - AT Attachment) was developed as a 16-bit design standard for internal Winchesters on IBM PCs. The idea was to produce discs with controller and drive electronics integrated on a single small circuit board connected directly to the PC's motherboard.

IDE is cheap to implement, particularly when it comes to adding 'cache'; the direct connections mean that data transfer is quite fast, relative to disc size; and, with the demand for ever decreasing 'footprints', many manufacturers now produce 'hardcards', that is, small drives mounted on the expansion cards that hold the electronics. Thus, where PC hard drives were once a complicated design problem, they are now an 'off the shelf' component. There are, as a result, a lot of IDE drives available and production costs have dropped through the floor. This has not escaped the makers of Archimedes peripherals.

On the Archimedes, an IDE drive is much like its relative on the PC except that the card carries an IDE_FS Rom which, like SCSI_FS, connects to FileCore and is nearly 'transparent to the user'. IDE drives come as internal or external packages with an expansion card, or as hard cards. Capacities run from 20 to 400Mb and rising, with prices from £180 to £900. Since Acorn adopted IDE on the A5000, a second drive can be added to it without an additional card. IDE manufacturers for Acorn include Watford, ICS and Risc Developments.

IDE is a powerful hard disc solution and, although it has been extended to include external drives, it is unlikely to be used with CDs, tape drives and so on, if only because of interference problems inherent in the use of long external cables connected to processor buses. IDE cards support two devices each.

Larger removable drives exist in the form of magneto-opticals and Write Once Read Many (WORM) optical units. If 'cartridge' sizes and access times are appropriate to your needs, and you use enough of it, removable storage can be very economical (see box: above).

BACKUP DEVICES

As the amount of disc space required by single users, let alone whole networks, increases, the idea of data loss from hard disc failure becomes more frightening and backing up on to floppies becomes more depressing. Demand has grown for devices capable of quickly copying whole hard discs and tape drive prices have fallen accordingly. SCSI transfer rates make it an ideal interface for the purpose.

The most common SCSI devices are 60Mb and 150Mb tape streamers that cost £600 to £900 and record 60Mb in about 20 minutes, but new technology is bursting out all over, and competitively priced 1Gb DAT (Digital Audio Tape) machines are beginning to appear. Oak Solutions packages SCSI tape software with its units which, among other things, does 'midnight backups' and error checking while you're dancing the night away. Tape software also exists in the public domain (*Tape_FS* and *TAR*)

SCANNERS

High resolution flatbed scanners can produce up to 8Mb of data from a single A4 page and, if you're into that sort of quality, SCSI is a must (a 16Mb A540 would help as well). The main Acorn supplier of SCSI scanners is Computer Concepts, whose latest model, the Scanlight Professional, is about to be released. It's a 256 greyscale, 300dpi device, which comes with Computer Concepts' own drivers and works with all Acorn compatible SCSI boards.

WHERE WILL IT END?

The disc wars continue. The choice between IDE and SCSI depends very much on the needs of the user. IDE drives tend to be faster and cheaper than SCSI drives of same capacity, but the interface currently lacks the expandability and range of SCSI (see box: lower left). The other big attraction of SCSI is that, should you exchange your computer for this year's model from Acorn or – heaven forfend! – another manufacturer, you can take your peripherals with you.

There are many SCSI cards available for the Arc, and most work well with fixed discs. With more exotic devices, however, there are still a few problems, so it may be worth discussing your needs with the manufacturer of the peripheral that interests you.

It's dangerous to predict the future but here goes . . . SCSI is a powerful and versatile interface with a big following. The selection of devices available increases as costs fall, yet the specification more than meets current speed requirements. In the future, someone will probably develop an optical bus standard to beat SCSI into a cocked hat, but it'll be around for a few years yet.

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PRIME TIME

Fin Fahey looks at Maths Sieve, an introduction to the discrete charm of the prime numbers

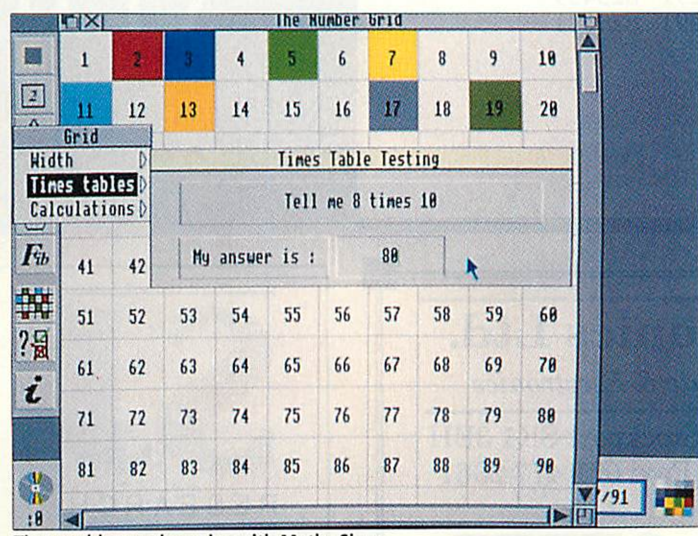
Many great mathematicians have remarked that for them numbers were not cold unfeeling cyphers, but individuals with their own quaint eccentricities and distinct personalities. Developing this keen appreciation and seeing numbers as helpers, not enemies, must be one of the main aims of any maths curriculum.

Maths Sieve, from Computer Tutorial Services, seeks to achieve this. This program is aimed at children from eight years up to GCSE level and is contributory to National Attainment Target 5.

The name derives from Erastothenes' Sieve, a method for extracting prime numbers from the main mass of integers which is among the earliest algorithms known. Fascination with prime numbers is at the heart of advanced modern maths, and barely a month goes by without someone announcing a new value for the highest prime known. *Maths Sieve*, effectively a teaching game, emphasises the spiky aloofness of the primes against the background of more 'domesticated' integers.

Maths Sieve is fully Risc Os compliant, and can be installed on the icon bar. Before starting on the program, a level from one to three can be selected, depending on the user's age. The main display is a number grid, which can be configured to show up to 1000 integers. The default display shows a 10×10 grid, up to 100, but this can be scrolled down. The emphasis on primes starts immediately, as the first eight prime numbers are highlighted in different colours. Clicking on the squares for any of these numbers will tag all the numbers on the grid that are multiples of this prime with the appropriate colours.

The Menu button brings up a number of options on the main grid. Width is used to configure the size of the table, and Times Tables tests the user on their times tables, with random questions. Calculations is an informative option, only available on level three, which allows the user to enter a single number (for Powers) or two numbers (for lowest common multiple or highest common factor) and the program displays all numbers fitting the criteria.



Times tables made easier with Maths Sieve

By the side of the number grid, a toolbox provides other options. The first clears the grid of any coloured tags and is followed by five icons that will display the opening numbers for a number of series: square, triangular, pentagonal and hexagonal numbers and the Fibonacci series.

Square numbers are obviously the squares of the integers: 1, 4, 9, 16, 25 . . . The triangular series goes: 1, 3, 6, 10, 15 . . . , which is understandable when 10 is regarded as 1+2+3+4. The other options follow the same reasoning. The Fibonacci series is an invaluable concept to reproduce, as it has become ubiquitous, popping up in such applications as speed sorting, and is also visible in many natural structures like plants or the wings of birds.

At the bottom of the icon window is a number information box. This can be selected to obtain in-depth information on any given number, which depends on the level. The user enters the number, and the program displays a complete set of information about it – if it is odd or even, square or triangular, what its prime factors, factors and multiples are and so on. To make life easier, two arrows at the bottom allow the user to scroll through the entire set of integers.

More can be obtained from this window using the Menu button. This highlights one of *Maths Sieve* important features – the ability to save the number information data. This lets the pupil save the data on any number, which allows individual databases to be built up as part of an ongoing project. Other information can be obtained: reciprocal, an unusual excursion into real numbers, displays the decimal reciprocal of the number. Sum of factors can be used to determine whether a number is perfect – a perfect number is equal to the sum of its own factors (the first two are six and 28). Finally you can find out how many primes there are less than the current number.

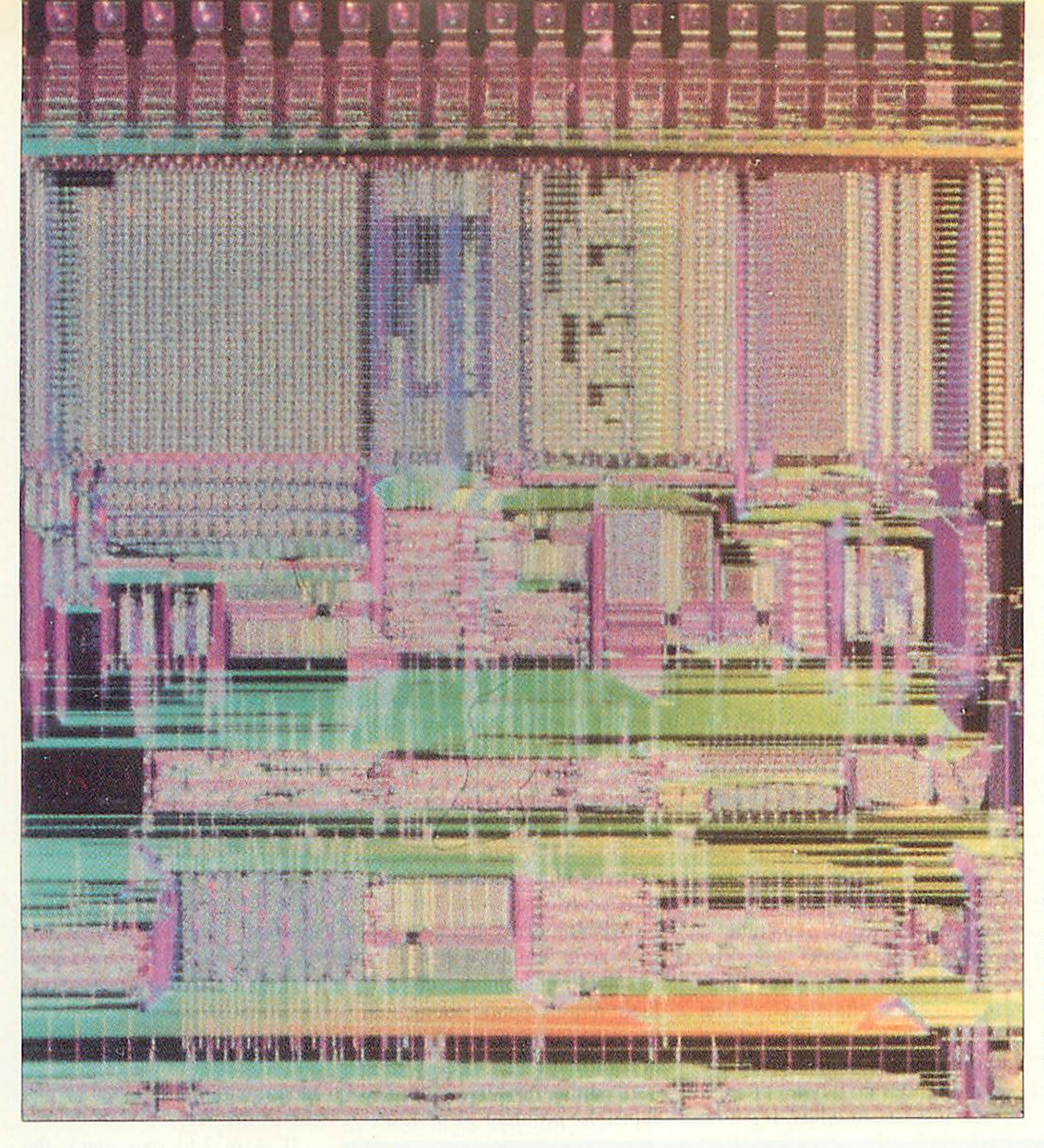
Possibly the most important part of the program is the multi-player number game. This provides a way for the children to test out their knowledge against each other. The game board displays the integers from one to 100, and allows the players to each select a cover. They can each then in turn roll a 'die' which gives them a random number depending on the level (level two, for example, shows 2, 3, 5, 7, 11 or any prime number). The player must then click on any number on the grid that hasn't already been selected that has that number as a factor. The object of the game is to build a row, column or diagonal of four numbers, whereupon that player wins.

Maths Sieve is an open-ended program, covering a number of topics on the National Curriculum. The review copy came with an adequate operating manual but most aspects of the program are self-explanatory and although the accompanying teachers' notes were still under preparation, they look like they will be fairly extensive.

As the standard of educational software goes, this is a well designed, inexpensive and involving program. It doesn't coyly seek to restrict pupils' access to information in some game of educational hide-and-seek, but instead tries to draw them into an ever-expanding world of knowledge. Best of all, the game component should make it fun to use.

PRODUCT DETAILS

Product: Maths Sieve
Supplier: Computer Tutorial Services, 4 Mill Hill Road, Cowes, IOW, PO31 7EA Tel: (0983) 294333
Machine: Archimedes
Price: 19.95 inc VAT



As the Arm chip goes global, Ian Burley talks to its designers

UP IN ARMS

These days the Arm chip is firmly in the spotlight. Only recently Apple's new Newton computer was launched amid much media attention. Known as the personal digital assistant, it has a powerful, efficient chip that consumes next to no power – the Arm processor.

Naturally, all this attention is good news for Acorn. Arm chips are vital to Risc OS machines. And at the centre of all the fuss is Arm Ltd – Advanced Risc Machines – the Acorn spin-off, financially backed by Apple, and entrusted with the future of Arm technology.

I recently visited Arm Ltd, which runs its operations from a converted 18-century barn in the village of Swaffham Bulbeck. There I found a small but highly motivated team who aim to put Arm technology back on top of the global Risc processor league.

THE ARM STORY

Arm Ltd was formed in 1990 by surprise partners Apple and Acorn. At the time, Apple coyly declined to confirm its intentions. IBM and Apple had already announced a new Power PC platform and many onlookers were convinced that Arm was central to this. In reality, Apple's separate PDA project, which eventually leading to the Newton, was already under way. Apple chief John Sculley once predicted a world PDA market of $3 trillion and, if this is true, the Power PC project could prove to be small fry, compared to the potential of PDA effort.

The story of Arm Ltd is fascinating for Acorn watchers. VLSI Technology, which made Arm chips for Acorn, conjured up enthusiasm at Apple as early as 1987, the same year Acorn launched the Archimedes. In fact, Apple almost launched some Arm-based products of its own.

However, Apple was concerned that Acorn had direct control over the Arm chipset. Meanwhile, Acorn was unable to match the admiration its Arm technology was earning with hard third-party sales. The pioneering chip was falling behind as other companies started to produce super-powerful Risc designs. Sanyo was signed up as a second source of Arm chips, but Sanyo's Arms never reached production.

By 1990, John Sculley was talking about advanced personal computers, dubbed as PDAs. Larry Tesler, who was in charge of Apple's research program, was an admirer of the Arm's low power consumption and efficient design. He thought it ideal for battery-powered computing. Tesler was soon in charge of the PDA project and was determined to use Arm chips despite two problems. The first was technical: the basic Arm design needed some changes. The second problem was the Acorn factor.

Acorn's managing director, Sam Wauchope, and technical director Malcolm Bird met

Larry Tesler in August 1990. Tesler was impressed by the enthusiasm with which Acorn's in-house VLSI design team greeted his technical requirements. The message was: you want changes? No problem. The deal was sealed.

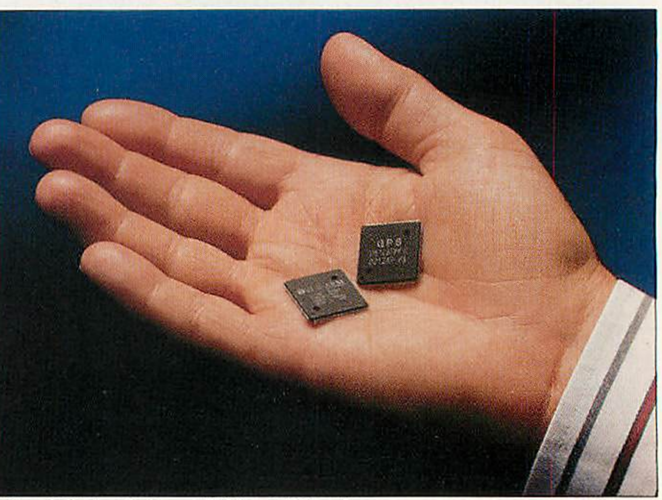
Wauchope was brave enough to realise future development of Arm technology could be better served by an independent company – especially with Apple's backing. This would be good for Acorn because investment in the very chips Acorn depended on was secure. By November, Arm Ltd was formed with Apple and Acorn, each holding 46 per cent of the stakes while the remainder went to VLSI Technology. Most of Acorn's VLSI design team relocated to Arm Ltd and Robin Saxby was hired as managing director.

THE GOAL

Arm Ltd was formed because Apple needed the chips for their PDA project. But the company wanted to promote the Arm chip in its own right. It wanted to see the Arm chip replacing older Cisc (complex instruction set) processors in portable products or embedded control applications. Arm Ltd is also committed to what are described as 'cost-sensitive performance' uses like 3D colour graphics and home computers such as the Archimedes.

Arm Ltd has only 30 staff, yet in 18 months it has produced four new Arm6 family members and continues to develop the rest of the Arm chip set. Faster Arm700 and 800 series chips are in the pipeline, too. There's also the FPA10 floating-point accelerator chip – a sort of Risc maths chip as well as custom developments of earlier chips like Arm2.

One of Arm Ltd's key strengths is that it can customise chips to a customer's requirement very quickly. Robin Saxby, calls this changing chip 'flavours'. The Arm610 was developed from the Arm600 with Apple in mind and the whole process took just four months. It's now being produced by Apple's American partner, VLSI Technology, and GEC-Plessey Semiconductors in the UK.



US and UK Arm610s: available at $20 each

Being close to the customer is a priority at Arm Ltd and last year an office in Los Gatos in Silicon Valley was opened to help customers develop their requirements, though all key VLSI design work remains at Swaffham.

In June, Saxby went to Japan to promote Arm Ltd – he ended up staying two weeks. "We made the pages of three of Japan's top newspapers; there's considerable interest in our technology out there," he enthused. "We were told our seminars were some of the best attended this year," he added. Saxby is soon returning to Japan for another two to three weeks of lobbying and hopes to announce a Japanese joint project by the end of the year.

If Arm Ltd can crack the Japanese market, we could soon find Arm chips in anything from computer game consoles to personal organisers to cellular telephones.

Could Acorn's original shoe-string band of Arm chip designers back in 1984 ever have thought their pioneering technology might be on the brink of ubiquity eight years hence? Similar optimism, based solely on the Arm's merit five years ago, was short-lived. This time it's different; one senses the Arm will actually make it.

WHAT'S IN IT FOR US?

Of course, uppermost in *BAU* readers' minds is – how will Acorn benefit from Arm Ltd? Until Acorn publicly reveals its own plans, there's no way Arm Ltd can be persuaded to discuss its customer's requirements in detail.

It's no secret that an enhanced video controller called VIDC20 is under development and this will probably offer 24-bit colour for on-screen photo-realism in future Archimedes computers. But Arm Ltd is tight-lipped about even that. It's the same

THE NEXT GENERATION

A lot of confusion has surrounded the burgeoning new Arm6 family. So, to clear matters up, here is an overview of the new chips.

Acorn currently uses Arm2 and 3 generation chips pre-dating Arm Ltd. Apple uses the Arm610, a member of the new Arm6 family developed by Arm Ltd. Arm6 itself is a macrocell, not a chip. The Arm6 macrocell is an enhanced Arm2 processor core design which can be easily pasted into new composite silicon designs using special CAD tools.

Improvements include one-micron fabrication size and very low power consumption static CMOS construction. Arm6 occupies just a tiny 2.8mm square corner of the silicon in Arm600 and 610 chips, for example. An improved ALU (arithmetic logic unit) reduces clock cycles required to compute some instructions. Byte ordering is now switchable between little and big 'endian' for compatibility outside outside the Acorn fold. The address bus width has been increased from 26 to 32 bits. In 32-bit mode an extra status register accommodates flags which used to reside in the first six bits of the program counter.

Risc OS can't currently use the Arm6 32-bit mode, but switchable 26-bit compatibility is retained and the latest Risc OS 3.1 version is Arm6-aware. Arm6 is also better at dealing with virtual memory addressing.

The simplest Arm6 family member is the Arm60, Arm6 in its own chip package – which now conforms to the industry standard JTAG boundary scan standard for chip testing. Arm61 is pin-compatible with the old Arm2, as used in all Archimedes computers up to the Arm3-equipped A540, A5000 and the new A4. Arm600, like Arm3, has a 4K instruction cache to prevent the processor having to wait for external memory to keep up, but there the similarities end. Arm600's cache is more power efficient and there's also a two word write buffer. This further helps the processor retain full momentum and contributes heavily to Arm600's typical 40 per cent performance improvement over Arm3.

Arm600 contains an on-chip MMU (memory management unit) developed from MemC20, which was never produced. It's incompatible with the MEMC1a currently used by Acorn. The new MMU incorporates vital memory partitioning functions for an object-oriented operating system, as used in Apple's Newton. Arm600s can talk to other devices, floating-point accelerators or even other Arms, via a co-processor interface.

Arm610 is a more compact Arm600 *sans* co-processor interface. Arm610's advanced 144-pin Thin Quad Flat Pack (TQFP) chip is extremely small and consumes much less current than comparable chips.

One of Arm Ltd's customers recently benchmarked the performance of a 20MHz Arm610, which Arm Ltd nominally rates at 15mips. The result was 25K dhrystones per second. They concluded performance was comparable with a 35MHz Intel 486DX or a 40MHz Motorola 68040. The benchmark is simply a statistic but it's worth noting Apple's fastest Macintosh Quadra uses a 33MHz 68040.

Rival chips consume several watts of power while the 610 is rated at 0.5w on a 5V system or 0.3w in a 3V system. No other commercially available microprocessors approach Arm610's watt/mip ratio and Arm Ltd points out that Arm610 is cheaper to manufacture. VLSI Technology lists Arm610s as being available for from about US$20 each in quantity.

for the long-awaited FPA10 floating-point accelerator, which is even on some Acorn A540 brochures.

So is Arm technology going to keep up with the recent spurt in performance shown by Intel in its 486 PC processors? Robin Saxby had a positive response: "I can't answer for Acorn regarding what it intends to use its future products for, but while it's true we have stated that Arm is targeting portable, telecomms and other embedded controller applications, Arm processors will get faster with time."

Saxby told us that Arm was never designed to compete with the monolithic high-end Risc monsters, which Mips, Sun Microsystems and DEC currently produce, but he is unworried by today's fast Intel 486s and tomorrow's 586s. "Arms are simpler, cheaper to make and more efficient," he explained. The future Arm700 and 800 series should keep Acorn in touch with the PCs of this world although, maybe, the large performance lead Arm2 and Arm3 once enjoyed over the PC chips will not return for a while.

But a super-high performance Arm processor could be with us as early as next year, if only in experimental form. "We are involved in a couple of projects with Manchester University's Professor Steve Furber, one of the Arm chip's parents, which includes Amulet, an asynchronous Arm.

"A very high-speed bipolar version of this chip could run at 100mips, but we won't see that as a commercial product until after the Arm8 range is out of the way in several years time." And to think the original Arm chip first "ran" as a simulation, written in Basic, on a humble Beeb with a second processor.

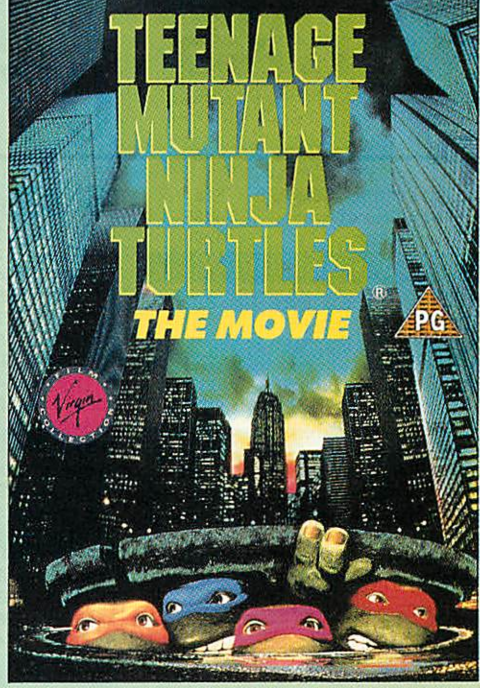
With just 24 engineers, Arm Ltd is tiny, but it is already showing the semiconductor giants the way to go. There's that inescapable David-and-Goliath feeling which first started back in 1985 when news of Acorn's home-grown Risc first trickled out. The old adage that small is beautiful is perfectly borne out here. The pressure is on Saxby and his team; "It's hard work," he says, "but a lot of fun."

SPOT THE ARM

Up until about five years ago, Arms were the world's best selling Risc chips. And although most of them have ended up in Acorn products, other Arms have found their way into a diverse selection of products. Arms are fast and cheap, ideal for accelerating things. Perhaps the second most popular application for the Arm is as the centrepiece of the Arm3 upgrade board.

Meanwhile, Radius in the US was an early third-party Arm chip customer. Radius uses 10MHz Arm2s in graphics accelerator cards for Apple Macs. The cards weren't the fastest but came out tops in value for money. Radius successfully ported Apple's key OS graphics driver code, QuickDraw, to the Arm.

But, did you know Arm is an Oscar-winner? Jim Henson's Creature Shop is a high-tech puppet company, founded by the inventor of *The Muppets*. It won an Oscar last year for its Henson Performance Control System that uses Arm-based controller cards supplied by Micro-robotics.



Henpec's claim to fame comes from the second *Mutant Ninja Turtles* film. It produced those complex facial expressions. Previous Jim Henson creations required up to 50 hand-operated controls to perform similar tasks. Having tried eight-bit controllers the company decided to upgrade to 32-bit Arm power.

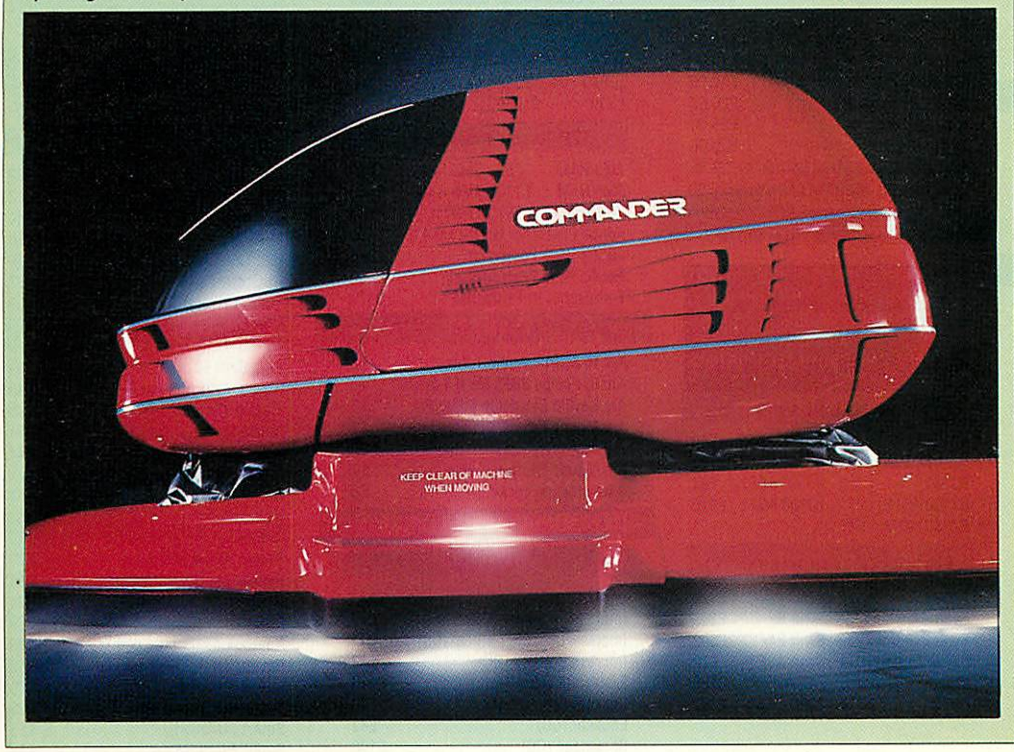
David Housman of JHCS explained: "The Arm is low-cost, it has a good instruction set, and has very low power consumption, making it suitable for location shots. And the Arm processor has a superb C compiler that is streets ahead of anything available for PCs, especially in terms of code density."

Another impressive example of the Arm at work is a Rediffusion simulator. Flight crew trainers are usually about $10 million, but the Arm version is much cheaper! Rediffusion produced Commander, a baby flight simulator with hydraulically operated cockpit. It costs £45,000 and is a coin-operated arcade simulator.

Commander has a hybrid control system with a 286 PC running the game program and sending high-level graphics and sound instructions to a pair of cards each sporting an Arm3 processor. Rediffusion claims Commander is the first arcade simulator to integrate four key elements: real-time control of the vehicle, motion, dual display screens featuring high-resolution graphics and Midi-controlled sound.

Other applications worth mentioning include real-time data logging equipment, a PostScript controller system for Olivetti's ETV word processor workstation and PC background processor cards.

Acorn co-founder Hermann Hauser had a special version of the Arm2 processor embedded in a custom chip which was to be the heart of his Advanced Book Computer. Hauser calls his chip Hercules, small but powerful. Ironically, the Advanced Book Computer does not seem to have a bright future, while Apple's remarkably similar Newton is currently in the limelight.



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Orion Computers



NET GAINS

Nick Wetherby points out that two computers are better than one, especially when they're linked up

Networking is one of those topics that's usually seen as 'not for me'. Leave it to the big schools and offices. But if you've got more than one Acorn computer, the attractions of linking them together are clear . . . and it isn't difficult or that expensive.

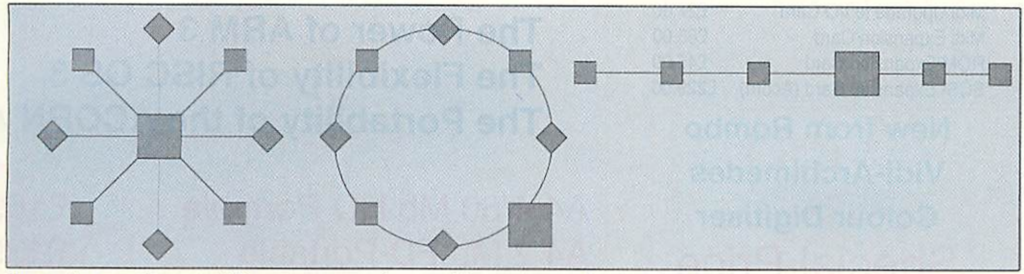
Networks allow you to do several things not possible on a roomful of 'standalone' computers. First, you can easily pass work from one computer to another. Several people can work on the same project at once (though usually not on the same file at the same time), and collect all their work together easily. Second, networks allow you to share peripherals – you can have a single printer and a single hard disc shared by all the people on a network.

BASICS

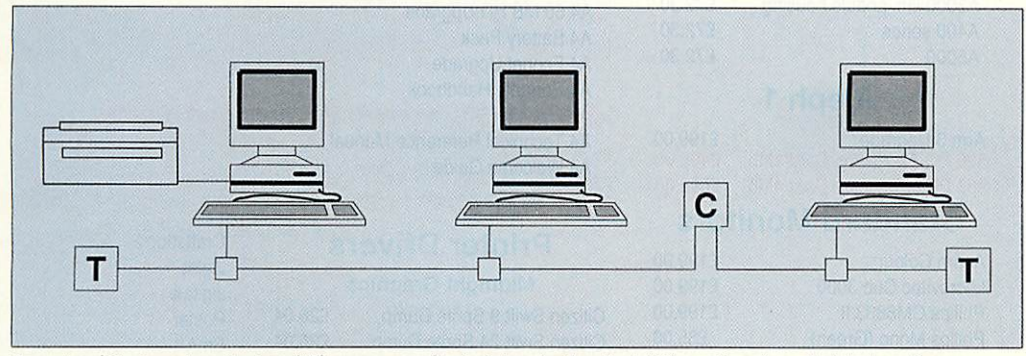
Network argot is almost impenetrable, but there are three really important things to discern. One is the cabling standard. You can use twisted-pair cable (like telephone wire), or coaxial cable (like TV aerial cable). These both come in all sorts of different flavours – they differ in the number of wires in a cable, how thick the wires are, what voltages are used and so on. You can even use something exotic like microwaves or optical fibre to transmit the signals. The second vital feature is the protocol used – the 'language' the network messages are sent in. You could use one set of cables to run two 'networks' – each using different protocols.

Thirdly, there's the topology – the way you plug the network together. There are three main topologies – buses, rings and stars. A star is where each computer is linked directly to one central point, rather like telephones linked to the exchange. All communication on the network has to be mediated by the central machine. A ring is like a bus – there's one big long piece of cable, onto which individual computers (or stations) hook. Rings loop back onto themselves, whereas buses have ends like terminus stations on the railway. Here individual computers can 'talk' directly

DARREL REES



Networks come in several flavours – stars, rings and buses: Econet is a bus (the large squares are fileservers)



Econet architecture: terminators ('T') suppress reflected signals, the clock ('C') synchronises all data transfer

to each other as well as to the central machine – the 'server'. Indeed there might not even be a server, as the network could be 'peer-to-peer'. Or there could be several servers, all doing different jobs.

So what is the server? A fileserver is a central storage point on a network. Instead of each individual computer having a hard disc (or its own floppy disc drive), you save files via the network. Everybody's files are sent to the server and stored on a big hard disc. The server's job is to keep track of which file belongs to which network user, and to send them back when users want to load them again. Ideally, a fileserver has a huge and fast hard disc for this central storage. This also makes it easy to keep data safe – because it's stored centrally, it can be backed up centrally, perhaps using a tape streamer to back everything up at once.

To keep track of the files' owners, the network has 'users'. When you start to use the network, you 'log on', or tell the fileserver who you are. Each file has a user it belongs to, and only that user can read the file – unless the owner explicitly allows others to read the file. One user – the network manager – has access to everything, and can set up new users and tweak the fileserver software. Note that a user is not the same as a station: a user can log on from any computer on the net and see the right files, and some other user using 'your' computer will see only their own user's files.

By extension, just as you can have fileservers, you can have printservers which print whatever you send them; database servers which store data records for you and pass back only the bits you need; teletext servers which provide the teletext pages you ask for; even 'compute servers' which send back the answers to particularly difficult problems you send them.

All the networks so far have been LANs (local area networks). You can also connect them together, with repeaters, bridges or routers that pass traffic from one net to another. And networks can be expanded across a city or across the globe forming WANs (wide-area networks).

Econet has been Acorn's standard network since the beginning – the earliest Atoms could be connected to the latest A5000s. Econet defines all the parts of the network – cabling, topology and protocols. It uses special five-wire cable in a bus topology. At each end of the cable there's a 'terminator', and somewhere in the middle you need a 'clock'. The computers attach to the main cable via an Econet module (a tiny interface board) and a short lead. The Econet filing system software necessary is built in to each Arc, and comes on Rom with the module for the Master series. Older BBC model Bs need a different type of interface.

In fact, if you've got just a few computers in the same room, you can connect them up using an Econet Starter Kit plus an Econet Lead Set, which contain all you need – a clock, two terminators and enough little cables and T-pieces – plus an Econet module for each machine. You put the modules in the machines, and just plug everything together. There are even access boxes in the Starter kit that can be screwed to the wall and linked by Econet cable for a more permanent installation.

Assuming at least one of your machines is an Archimedes, the best way to set up a fully-functioning network is to use Acorn's Level 4 Fileserver software. This allows all the computers – any mix of BBCs and Archimedes machines – to share part of the hard disc of the fileserver Archimedes. In essence, you create a number of directories on the hard disc, each of which belongs to one of the users on the network. The software keeps track of which file belongs to whom.

Another way is to use Oak Solutions' *Sharer*, a mini-server which allows you to set up a directory on your hard disc that can be shared by everyone else. Unlike the full server software, *Sharer* doesn't keep track of users' access rights – files are either shared or they aren't. But this is a simpler and cheaper option, perhaps for home networks.

So having built your network, how can you use it? A network encourages co-operation and group working – small wonder that they are popular in schools. Redwood Publishing's extensive network is vital to the production of *BAU*. All the Acorn machines used for writing, software testing, page layout and sub-editing are networked. Next month, we'll take a more detailed look at what you can do with a network.

ETHERNET

While Econet is Acorn's own networking system, Ethernet is a well-established and internationally-agreed standard used by a wide range of computer systems. First developed by Xerox, it really comprises a set of three physical standards – generally known as 'thick' and 'thin' coaxial Ethernet and 'twisted pair' Ethernet. The protocols (the 'network language') used with Ethernet cabling vary: many are proprietary to individual companies, but one common standard widely used in the Unix world is known as TCP/IP.

You can connect Archimedes computers to TCP/IP networks using an Ethernet interface podule and Acorn's TCP/IP software. But it's important to check your Ethernet cabling first – all the current podules cater for Thick and Thin Ethernet only. Connections to twisted pair cabling can be made, but only at additional cost.

The major advantage of Ethernet is speed: it runs at a theoretical speed of 10Mb per second – about the same as a fast hard disc. Compare that with the maximum of 0.2Mb per second for a reasonably-sized Econet. Loading a large file could be 50 times faster. But Ethernet costs real money: budget on at least £200 per computer for the interface podule, plus the hefty cost of cabling. Econet is remarkably inexpensive, at about £40 per computer for the Econet module.



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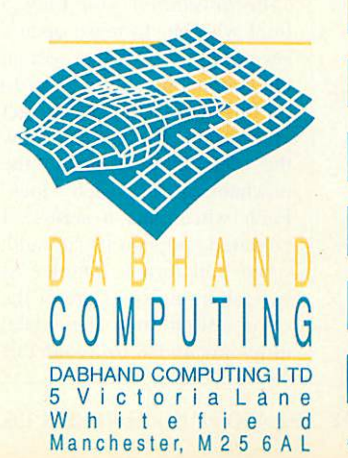
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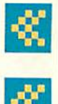


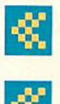
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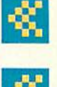
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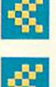


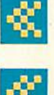


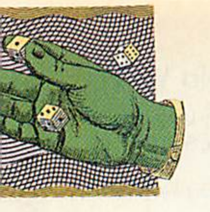






GAME SHOW

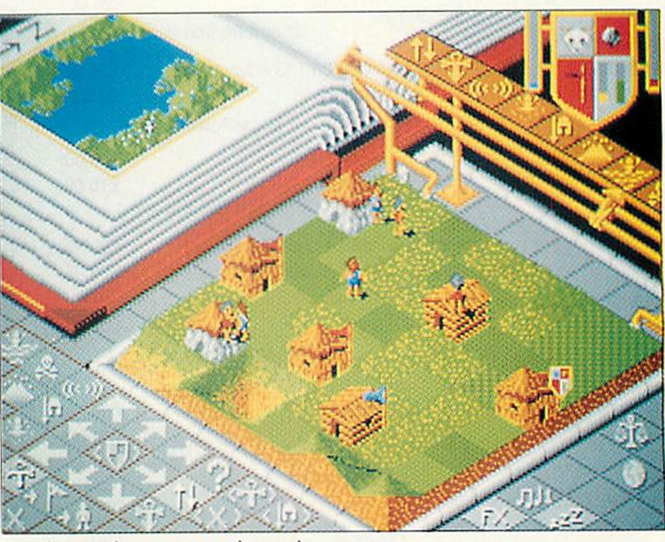
With this year's *BAU* show on its way, things are hotting up on the games front. The *Deluxe* version of *Saloon Cars* has arrived, and there will be a set of extra tracks for it coming along soon. Also from 4D, *Nevryon 2* and *Cyber Chess* should appear soon. Unfortunately it looks as though the mysterious *Black Angel* and the elusive *Chopper Force* will still be at the 'nearly finished, honest' stage by the show.

The big news is that Krisalis has a host of titles on the way, and next month we'll finally be having a look at the long-awaited *Populous*, as well as *Lotus Espirit II* and *Oh No, More Lemmings*. If *Populous* is as good on the Arc as it is on 16-bit machines, then we're all in for a treat.

Arxe Systems has promised us at least a previewable copy of a multi-level parallax shoot 'em up, *Scorpius*, and the company is also working on an early version of a 'simple but fun' *Chuckie-Egg* style platforms game. Also in the pipeline is a new *Repton*-type arcade adventure from Superior. For golf enthusiasts, CIS is about to release a new version of the golf game *Microdrive*, complete with course designer.

Anyone who's ever played an Infocom text adventure on a PC will know just how good they are. Well, Arc owners will now be able to take advantage of Infocom's back catalogue, thanks to a new PD application which interprets the data files from these games, and allows them to run on an Arc.

The application, written by Tim Gladding, is freely available on most bulletin boards, but course you will still need an PC copy of each game to use it. Virgin Games still sells 10 Infocom titles at a bargain £9.99 each, ranging from *The Hitch Hiker's Guide To The Galaxy*, to *Leather Goddesses of Phobos*. We may well feature the application in the *Freebies* section of our monthly disc in the future if we have the space.


Populous: at last, you can play god

Finally, Paul Jackson has written in to tell us that, in addition to the *James Pond* cheat published in July's column, the number keys plus 1, 2 & 3 on the keypad can be used with the cheat to skip to levels 1 to 12 respectively, and to see the end screen. See you next month for *Populous*, and much more besides.

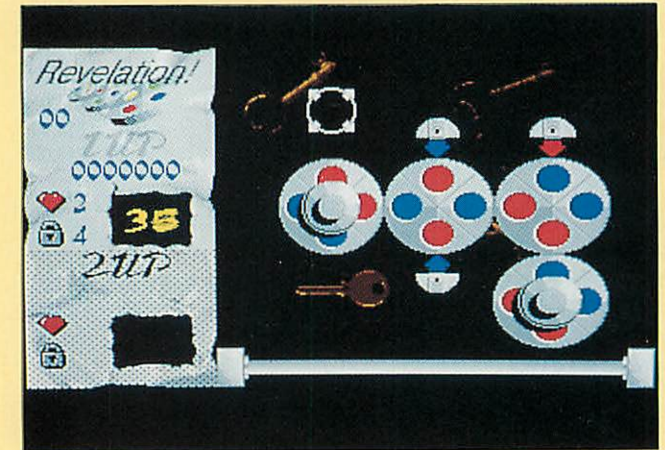
Mathew Tizard

THE KRYSALIS COMPILATION

Krisalis
Tel: (0709) 372290
Risc OS machines
£29.99

This is as much fun as it is value for money. *Mad Professor Mariarti, Pipemania* and *Terramex* have been seen before but they are accompanied here by a new release, *Revelation*.

In *Revelation* you play a thief who has to tease open a sucession of safes to get at the goodies inside. In order to do this, you will have to get your brain around just how the cogs interact inside the mechanism of each lock. Each wheel has a series of coloured spots on its rim and, when you turn a tumbler, if two adjoining spots are of the same colour then the wheel turns clockwise to avoid this clash. Sounds simple enough, but the colour clashes can lead to chain reactions which upset all your delicate safe-cracking, and trigger the burglar alarm!



Crack the combination in Revelation

Various bonuses and other devices come into play: for example you have the ability to 'lock' up to three of the cogs so that they can't move out of your chosen orientation. All this fiddling with locks and tumblers is against the clock, and the pace becomes sufficiently frantic as you run out of time to assure you that the game is a good one.

The sort of predictive skills you need remind me of the old *Downfall* board game. Inside the safes are nine deposit boxes, some full of loot, and some empty. Occasionally you find a bonus level inside, in which case you are given a single turn to solve another lock-system.

For the impatient, there is the usual password system to enable you to skip levels you've already cracked. Graphically *Revelation* is fine, although the best puzzle games don't need fancy graphics to spice them up, and, as ever, the background music is excellent.

The other games haven't changed, apart from *Terramex*. It has had a Risc OS facelift, now loading painlessly from the desktop and boasting a choice of two tunes. *Mad Professor* must be the nuttiest arcade adventure around for the Arc, and *Pipemania* is a modern classic. Krisalis has done it again; I reckon you get more than your money's worth here.

Josef Koestler

EXPLORER

Dragonsoft
PO Box 22, Whitchurch, Shropshire
£25.99
Eight-bit: Two 5.25in discs and 16K Rom

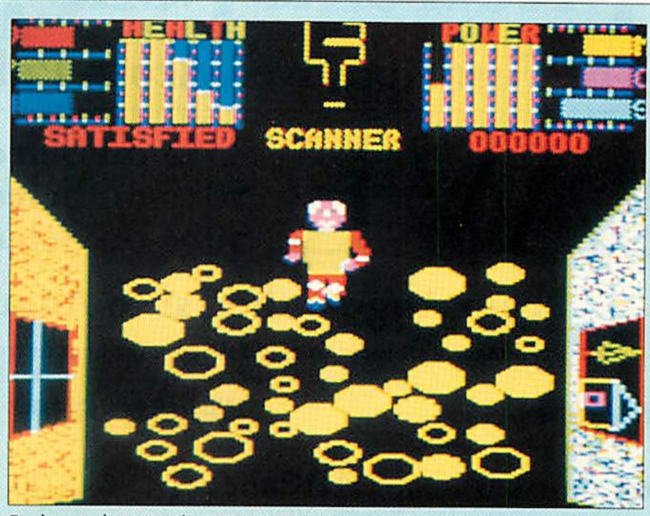
Fresh eight-bit software seem to be very thin on the ground these days, so it's good to see an independent publisher releasing a new Beeb title. You play the role of a boastful explorer who has been ostracised from his fellows' company until he can provide some proof of his unlikely tales. So off you go to prove yourself by exploring the four corners of the world.

Explorer is a commendably ambitious project which boasts 31 levels of mazes (each with 31 by 31 rooms) and a multiplicity of objects, monsters, foodstuffs and the like. In size and detail, as well as graphically, the game cannot be faulted.

A split mode screen is used which to give a text area for the menus and an area fro graphics. These are used to manipulate objects and otherwise interact with the game, and the range of scanners, displays and maps provided help you to keep track on your character's health and whereabouts. The sound quality is right up at the top end of the Beeb's repertoire.

The enormous size and scope of the game has to be accommodated by installing an extra Rom, but this size has its costs in running speed: As you move about, some rooms can take a full three seconds to appear, which is a little bit irritating when all you want to do is take a stroll along an empty corridor.

Indeed, more than half of all the rooms, beautifully drawn though they are, have absolutely nothing in them. There is simply not enough incentive for the player to keep on exploring the vast area – there are not enough puzzles or ways of interacting with the 45 different types of monster – and so the initial



Explorers shows an intense attention to detail

enthusiasm begins to sag, and you are left wondering just why you are playing. I suppose it all depends on the expectation you have of an arcade-adventure. If you are patient and enjoy the good bits when they arrive, then this is the game for you.

In my view, the game attempts to be all things to all people – arcade adventure, role-playing game, maze – but falls short of being completely successful in any of these fields. Perhaps the impressive vision and imagination of the programmers would be better served by a revised 32-bit version of the game.

This is the only instance I can recall of attention to detail being a game's undoing: here we have '12 earring types', but little gameplay.

Mathew Tizard

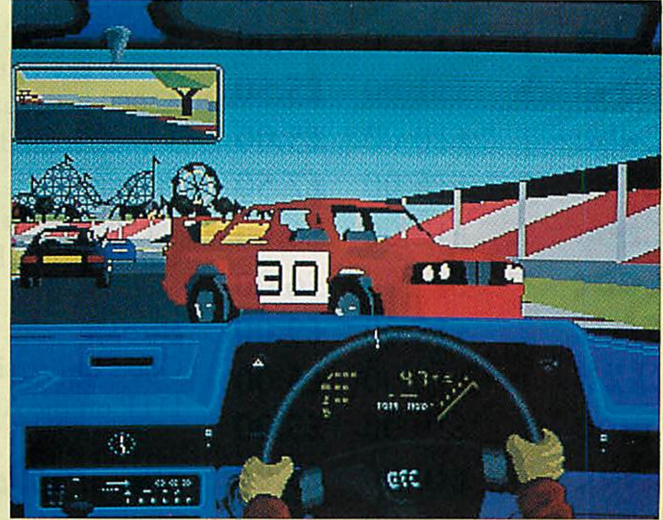
SALOON CARS DELUXE

Fourth Dimension
Tel: (0742) 769550
£34.95

I must start this review by saying that *Saloon Cars Deluxe* is not a new game – it is really version two of the Fourth Dimension's highly acclaimed *Saloon Cars* racing game. If you've not seen *Saloon Cars* then so much the better, because the *Deluxe* version is rather good.

Aficionados of the game will appreciate the improvements but probably won't be as impressed overall as somebody new to the game.

The main area of improvement is in the display graphics – full advantage is taken of the extra memory which is over 1Mb, and the increased speed offered by an Arm3. The original version behaved very oddly with Arm3s switched on. You now get a proper rear view mirror which is a true reflection of cars, road, scenery, bends and hills, though for some reason the horizon scenery is not included. All the other cars are vector drawn rather than being sprites. This allows them to be rotated, spun and crashed very realistically!



Saloon Cars maintains pole position

The Arm3 version, intelligently, increases the frame-rate of the game (how often the screen is redrawn per second) without affecting its actual speed. This improves the smoothness of the game but keeps the 'feel' the same.

Apart from these changes, many of the quirks of the old game have been fixed, and a few more mundane features added: You can now buy better brakes for your car, as well as gearbox and tyres and occasionally you get a rolling start for races. An easy test track has been added to get you into the game, a cheat function in the practice modes repositions your car after a nasty prang. Best of all, you can run the game from a hard disc, although you need to keep one of the floppies to hand for the software protection.

Further courses will become available on discs for when you get bored with Brands Hatch and Silverstone and a Formula One version is promised for later this year. The only feature I'd like to see included now would be the ability to look at the game from different viewpoints, with roadside cameras ready to record your most dramatic crashes! Oh, and perhaps a little work on the menus would have been handy.

Saloon Cars was one of my favourite games when it first came out and *'Deluxe* is a worthy successor. £35 is a lot of money for a game (£17.50 if you want to upgrade from 1.0), but it must be said that *Saloon Cars* is the best racing game available on the Archimedes at the moment.

Dave Lawrence

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QUESTIONS AND ANSWERS

Q My employer runs a bulletin board on a 286 PC clone. If I buy a suitable modem, is it possible to download the information into my PC Emulator? If so, how do I load programs into the Emulator?

K. J. Millard
Stockbridge

A **The wonderful thing about talking to other computers through the phone is most of the time it doesn't matter what they are. You can be at your Archimedes talking to any other machine, as long you both use the same communications standards. To communicate with your employer's bulletin board, you will need a terminal package such as *Hearsay II* and a modem that runs at an appropriate baud rate. The two machines must also share a download protocol like ZModem or Kermit. Once downloaded, PC programs can be transferred to Dos using the Emulator.**

Q I have a 4Mb A3000 with an HCCS 45Mb hardcard. My daughter often invites a number of her friends around to tea and they like to use the computer.

However, for understandable reasons, I would like to restrict use of the hard disc by some means without physically disconnecting it. Do you know of any utility which would help?

N.F.Halls
Surrey

A **HCCS has two upgrades that may be of use; one is already available and the company hopes to release the other in the autumn. The current version allows multiple partitions on the hard disc, which means you could format the disc with two partitions and then hide one by altering the configuration of your A3000. The unreleased version (which supports 16-bit rather than eight-bit SCSI) will include multiple partitioning and passwords. For more information, call HCCS on 091-487 0760.**

STAR QUESTION

Q As part of a degree course, I plan to construct a steering wheel and pedal control system to operate such driving simulations as *E-Type* from Fourth Dimension. I can build electronic hardware to simulate the controls, but would like advice on the cheapest effective way of interfacing the system with an A3000 or A310, perhaps using a joystick interface.

Graham West
Cambridgeshire

A The people from The Fourth Dimension say that given the technical know-how, you probably could connect your hardware to *E-Type* with a joystick interface, but they've never seen it done. They suggest you consider their *Saloon Cars* program, as at least a dozen people up and down the country, including the original programmer, have successfully built steering wheel and pedal arrangements for it. There's even a couple of pages in the manual devoted to the topic.



Saloon Cars

Q I use a BBC B, and for the first time I am unable to boot a disc on which I have an awful lot of information I need. When I press SHIFT/BREAK, all I get is the message "DISC FAULT 08 AT 00/00" and nothing I do will load it. Where might I get some help in order to overcome this fault? I confess that I haven't the slightest idea of the meaning of "08 at 00/00".

K. E. Kemp-Turner
Suffolk

A **If you've had your BBC for a while and this a new problem, you must look after your discs very well! To explain the message: Information is stored on disc in a number of concentric rings called tracks, which are further divided radially into sectors – your disc has a fault (number eight) on track 0 at sector 0. This means DFS does not recognise the format of the current disc so, unless you're reading an 80-track disc on a 40-track drive or vice versa, I'm afraid your disc has probably been corrupted.**

Causes of this include dust or grease on the disc surface, heat, physical or electrical damages. Floppy discs are not reliable. You may be able to recover your work with Computer Concepts' *Disc Doctor*, but since the fault is at the start of the disc, where the catalogue is stored, it may be totally unreadable. If this is the case, use your most recent backup disc. If you didn't take a backup . . .

Q I purchased a BBC Master about three years ago and it has worked perfectly until recently. Now, when I load a program, I get problems. When I press SHIFT and BREAK, I get the message "Bad Searching", and then the number five appears, runs slowly across the screen for five or six rows and then stops. After several attempts, I can get programs in, but then they stop and the number five runs across the screen.

K.Newell
Birmingham

A **You've got grot in your number five key. The key is getting stuck down and auto-repeating, filling the command line with fives. According to what else your computer is doing at the same time, this upsets the autoboot sequence and the machine attempts to start from tape, tries to fill the screen with fives, or crashes a program as soon as it looks for a keypress. To fix this, take the cap off the offending key and clean the switch with a mild solvent. Isopropyl alcohol (tape-head cleaner) from your local chemist will do the job.**

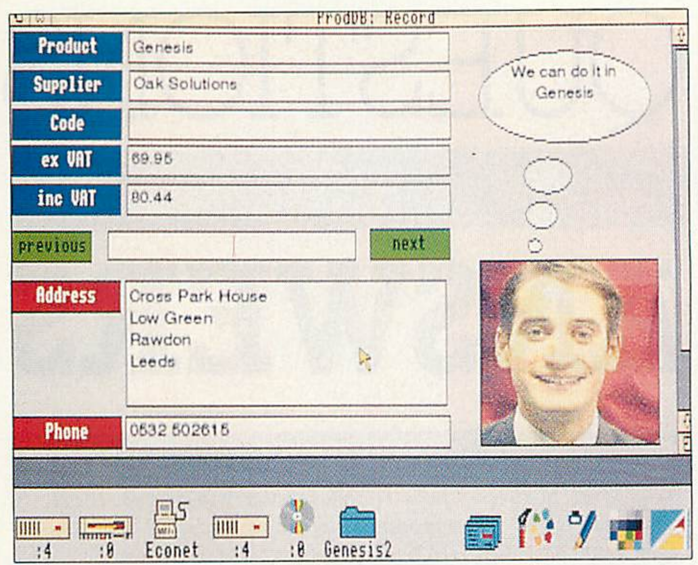
Q I would like to run a multi-user adventure game. I don't yet have a modem but I'd like to know if I'll need any extra hardware, and if *RiscBBS* by Bass is a suitable package – I understand it can be programmed.

Ainsley Pereira
Hampshire

A As games go, it's not going to be very multi-user with just one modem. To start with, you need as many modems and telephone lines as you have simultaneous players.

You will need a combination of hardware and software to turn incoming data from the modems into a single stream of information which can be interpreted by your game program (most MUGs don't use multiprocessing, as the rate at which they receive data does not justify it).

When it comes to writing the program that runs the games itself, I suggest you use a serious language like C. Multi-user games more often run bulletin boards inside their own 'envelopes' than the other way round. Don't let this answer put you off, but I have to say that you are really attempting a big project here!



Perhaps Genesis can get you started

Q I recently purchased a copy of *Impression* to aid me in the development of an encyclopaedia about the uses of herbs in medicine. My initial hope had been to incorporate extensive textual information and *Draw* file graphics tidily, within one 'off the peg' database, but friends tell me this option is not currently available.

I believe that *Genesis* has many of the features I require, but that it can't match the printed output of a DTP application like *Impression*. Perhaps I should use a more elaborate database like *Multistore*. Could you clarify the situation?

Tony Halmarack
Isle of Wight

A Your choice of software depends on the form you expect the completed encyclopaedia to take. If you are planning to end up with a printed book then I recommend that you use your *Impression* DTP package to assemble 'camera ready copy' from text and graphics.

In this situation, you could use any reasonable flat form database to order and index your work, and *Multistore* would be more than adequate. Alternatively, if you offer the information on screen, using *Genesis* to manage files on hard disc or CD-Rom would be more appropriate. Try reading *The Genesis Script Language Book* by David Tee of Oak Solutions (0274 620423).

Q I am an Acorn Electron owner, and I was wondering if you could give me information on any companies you know of from whom I could purchase add-ons such as joysticks, printers, disc drives etc. I would also like to know where I could buy Electron software and books on programming.

Joanne Nicholas
London

A Acorn stopped producing the Electron some time ago and I don't think anybody still sells commercial software for it. However, as you can see from our free ads, there is a thriving second hand market. If you'd like to contact other enthusiasts, send an SAE to: Will Watts, The Electron User Group, 134 Great Knightleys, Basildon, Essex SS15 5HQ.

CUSTOMER HOT LINE



Every month in BAU, Peter Glover from the Acorn customer service department offers you Acorn's advice and support

This month: part two of how to become a power user, with some speedy tips for you to try:

- In a directory viewer, Select can be used to mark the first item you want to act upon, and Adjust can then be used to mark other items simultaneously. All the marked items will then be acted upon. Try dragging on the entire selection of files, or use a menu operation to move them all.

- Double-clicking on Select runs a file, opens a directory, or loads up an application. If you use Adjust instead, the current window you clicked in will close as the new window is opened. This will help to keep the desktop tidy.

- When you make a menu choice using Select, the menu disappears as the action is taken. But if you find it necessary to make several choices, or are experimenting with settings (such as choosing the colours for an *Edit* window) this becomes tedious. Try using the Adjust button instead of Select so that the menu wil stay open on the screen. Note: This is provided by the application concerned, so it may not work on every application.

- To bring a window to the front, the usual method is to click Select on the title bar. However, you can click on the Adjust Size icon in the bottom right (when it is present), or use the Toggle Size icon in the top right of the screen.

Recently, Acorn has reorganised the categories of filetype available on the Arc:

There are 4096 filetypes, &000 to &FFF. Originally half of these were set aside for users, with the remainder shared between Acorn, AcornSoft and other developers.

During the past year, the rate of allocation of filetypes has reached the level where some rearrangements are needed to avoid running out of filetypes in the future.

The new distribution of filetypes is:

&000-&0FF – End-users' personal, non-distributed usage

&100-&3FF – End-users' distributed software such as PD/Shareware. Allocation by Acorn

&400-&9FF – Commercial software. Allocation by Acorn.

&A00-&AFF – Commercial software (was AcornSoft). Allocation by Acorn.

&B00-&DFF – Commercial software. Allocation by Acorn.

&E00-&FFF – Acorn use

The highlights of the new distribution are that the user area is halved to 1024 filetypes and 75 percent of the user area is now allocatable by Acorn on behalf of PD/Shareware programs. There are more filetypes free for commercial software, plus some redundant areas are now open for general allocation

Of course, many existing programs have filetypes from the area &100-&7FF. If you are the author of such a program, please inform us. We will record your usage of that filetype, so that a double allocation does not occur in the future.

Please note though – this 'amnesty' applies only to existing programs. For new programs, you should contact Acorn to apply for a filetype. Write to: Customer Services (Filetypes), Acorn Computers Ltd., Fulbourn Road, Cherry Hinton, CB1 4JN.

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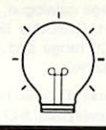
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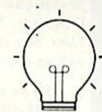
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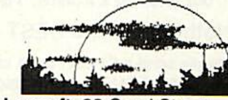
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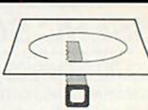
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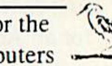
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ACORN USER ADVERTISEMENT PAGES – SEPTEMBER 1992

£15 STAR LETTER

Recently my school produced a book called *With All Thy Might,* detailing the history of our establishment. Since it could not have been produced without the Archimedes, I thought it might be of interest to other readers.

It was produced on an Acorn A5000 using *Impression* and output at 600dpi via a Canon LBP-4 printer with a LaserDirect interface. The photographs were scanned with Computer Concepts' Scanlight Professional and at first I had intended to use this for final output. Unfortunately, many of the photographs were very old and in poor condition; also many had to be taken from an old school magazine that had been printed with a rather coarse screen.

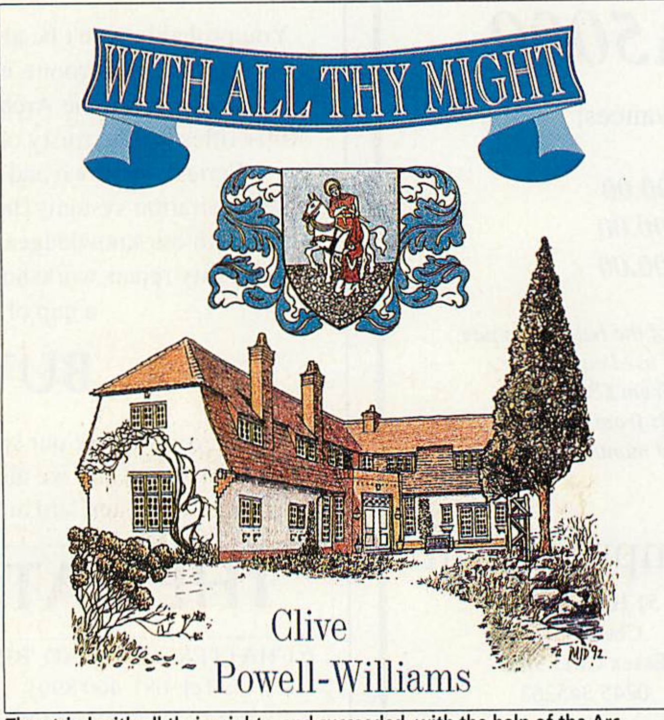
In the end we asked our printers to process the graphics, although we used the Scanlight to produce low-resolution scans to indicate cropping and scaling. We also used CC's *Business Supplement* to help with the marketing of the book.

Thanks to the speed and ease of use of the hardware and software I was able to take the book from 100,000 words of *First Word Plus* files to 75,000 words and 100 illustrations of camera-ready artwork in just a fortnight, while teaching a full timetable.

I don't know if the book will be of any use to you as promotional material for the Archimedes as a fully professional DTP machine. What I can say is that it would have been far too expensive for us to use anything else.

Alan Booth
Head of IT
St Martin's School
Northwood, Middx

We agree. The Arc provides an excellent DTP platform. *BBC Acorn User* is also produced each month using CC's *Impression* package.



They tried with all their might – and succeeded, with the help of the Arc

BLINKERED

First let me get one thing straight – I like the Archimedes. However, working in the computer industry as I do, I get repeatedly exasperated by the blinkered and somewhat naive views and attitudes prevalent in the Acorn market. As Graham Bell points out, PC 386 portables are considerably cheaper than the proposed price of the undoubtedly excellent Acorn A4 machine.

Who is Acorn trying to sell the A4 to? Schools? Not at that price in any quantity. Businessmen? I can buy a PC-compatible, as Graham Bell says in his review, much cheaper. Home users? I certainly could not justify £1700 being spent on another home computer.

As usual, by what it has left out, Acorn has produced an excellent piece of engineering but has restricted the A4's potential market before the machine is even available.

John Bates
Ipswich, Suffolk

FONT PLEA

I wholeheartedly agree with last months' letter from Elwyn Morris where he took issue with Ian Burley's article on word processors (Word Wise, *BAU* July 92).

Like me, he felt that *Interword*, despite all Computer Concepts' hype about *Impression*, is still the best professional word processor available for the Archimedes. It even outshines some available for PCs.

I think one of the worst aspects of the Archimedes is its failure to enable the 90 percent of users who have dot matrix printers to use their superb NLQ fonts.

All software packages urporting to support word processing, including *Impression* and *Pipedream,* are nothing more than DTP applications and the word processing, when it comes to dot matrix printing, is pure trash.

Here we are in 1992, ten years of BBC micros behind us, and we still have to revert to a word processor first brought out in 1986. So good was the application then, it has not had to be revised.

Acorn is to blame with its over emphasis on outline fonts and yet more fonts, and the truth of the matter is that the current Archimedes has been designed around DTP and nothing else.

I think a printer manufacturer should come up with a word processor which can use its fonts to full advantage. Then I am sure the software houses in the Acorn marketplace would start sweating.

E A Allchin
Bridgewater, Somerset

VIEW DOWN-UNDER

I feel that, although Acorn's machines are superior in design to the PC standard, the company is losing the battle for the small business, home and school markets here. In order to retain and expand its market, Acorn needs to follow the example of its competitors.

IBM, Microsoft and Apple are all trying to create operating systems which are multi-platform. If Acorn ported Risc OS to other platforms, especially MS-Dos machines, it would be able to take advantage of the current confusion in the market between windows and OS/2.

Victor Markwart
Wanniassa, Australia

Because Risc OS is very closely linked to the Arm chip set this makes such a development unlikely: it would be both an expensive and time-consuming project.

VACANCIES

In response to the article Situations Vacant (*BAU* August), though it is psychologically difficult to think users of other machines can manage better graphical output than the Arc, this must surely rank as one of its weak points.

I am a teacher who uses a dot matrix printer and, while the output is very good quality, it is also very slow. I don't know if it is feasible to speed up this process.

I was, however, disappointed that the A5000 didn't have a multi-tasking printer driver, which would at least free the machine while printing is going on. I was surprised also the printer driver was not included in Rom.

As regards software, I would like to appeal to all developers to store data in a standard format.

Robert Seago
Clacton-on-Sea, Essex

Risc OS machines can perform background printing. Simply print the document to file first: a far quicker process. Then drag the file on to the printer icon to print in the background.